

Should You Buy a Used Sports Car?

SPORTS CARS ILLUSTRATED

JUNE 1956

JUL 16 1956

A.N.C.

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SERIAL RECORD

JUL 23 1956

35¢

IN U.S.A. AND CANADA

Road Test:

New 1600 Porsche

By Griff Borgeson

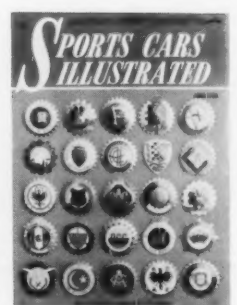
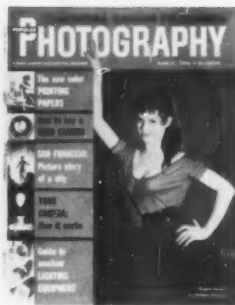


Ferrari's Jet Hot Monza

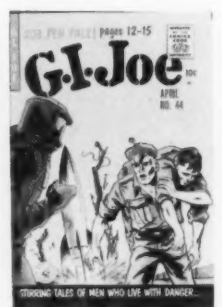
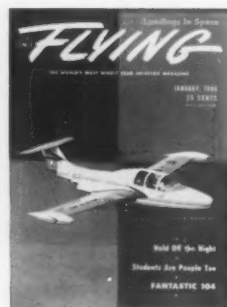
The New Porsche Engines



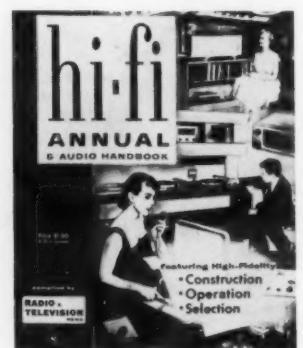
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JUL 16 1956

Up To 15 More Horsepower 6 Miles More Per Gallon

Or It Doesn't Cost You a Cent!

IT'S TRUE! Now you can get the breath-taking acceleration... jack-rabbit starts... blazing new power that you've dreamed about for years—simply by harnessing the raw, unburnt gasoline that your engine is wasting today! You can get performance from your present car that will make your friends gasp with astonishment—and you can save \$25, \$50, even \$75 a year on gas bills alone doing it!

Yes! You, yourself can fit this amazing GASOLINE ATOMIZER on to your car in as little as 20 easy minutes! And it is guaranteed to pay you back your full purchase price, in gas savings alone, in the first 3 to 4 short months that you use it. Here's why!

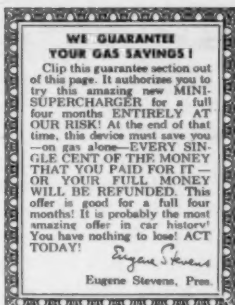
By RICHARD JOHNS

Mr. Car Owner! How would you like to have the driving thrill of your life now weekend? Next weekend you go down to your car—the same exact car that you've been driving for years. You've made only one simple change to that car, so easy that your 16-year-old son could do it! But now, when you turn on the ignition, a modern miracle of engineering science comes to life under your hood!

From the very first moment, you'll see and feel the difference in that engine. That engine will hum with new, throbbing power. When you release the emergency brake, your car will glide out of its parking space... roll down the street with your foot hardly touching the pedal. Every 30 or 40 seconds, you'll give that car an extra shot of gas; feeling it spurt ahead; testing the new power singing underneath your foot!

We ask you to pull up to another car at the stop light, of approximately the same year and make as your own! Wait until the light changes. Let the other car start first. Wait till the other car gets half way across the street. And then slam your foot down on the gas pedal!

Before that other car has even crossed the street, you will have caught up with him. For one brief second, you and that other car will race fender to fender. And then you will flash away from him... less than him... full block behind... you will look in your rear view mirror and see the startled look of amazement in the other driver's eyes!



WE GUARANTEE YOUR GAS SAVINGS!

Clip this guarantee section out of this page. It authorizes you to try this amazing new MINI-SUPERCHARGER for a full four months ENTIRELY AT OUR RISK! At the end of that time, this device must save you on gas alone—EVERY SINGLE CENT OF THE MONEY THAT YOU PAID FOR IT—OR YOUR FULL MONEY WILL BE REFUNDED. This offer is good for a full four months! It is probably the most amazing offer in car history! You have nothing to lose! ACT TODAY!

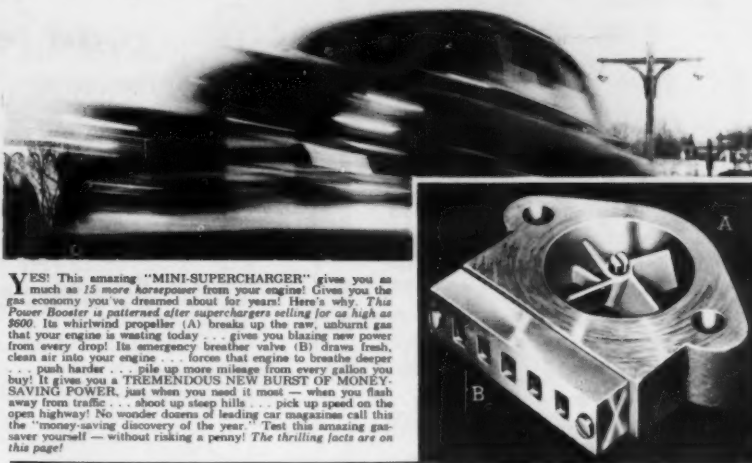
TEST THIS NEW POWER A HUNDRED DIFFERENT WAYS! But this is just the beginning! Test this equipment for one full month—entirely at our risk! Test it on the highway! Use it to flash away from other cars... spurt up the steepest hills... actually pass other cars in 2, 4, 6 and even 8 seconds LESS than you could have done formerly!

Test this equipment in long-range driving! See the enormous gas savings it gives you at high speeds! Prove to yourself that at 50... 60... even 70 miles an hour, your foot is still half-way up on the pedal—you still have all the reserve power you need to get out of any emergency on the highway!

Yes, and test this equipment in stop-and-go city driving! Prove to yourself that it gives you the instant acceleration you need to get out in front of the crowd... with far less gas than you're using today! Prove to yourself that it can actually save you \$25 to \$50 to \$75 on your gas bills every single year... that it actually pays back its full cost, in gas savings alone, during the first three or four months—or your full money back!

HOW DOES THIS PRODUCT GIVE YOU SUCH TREMENDOUS NEW POWER? And you get all this performance—and more—from a small, polished machine of bronze and aluminum that you can hold in your hand! Here's why:

Gasoline in its liquid form is not explosive. If you accidentally drop a lighted match into a bucket full of gasoline, the chances are 10 to 1 that that



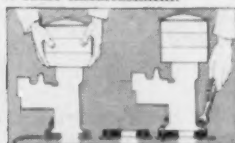
YES! This amazing "MINI-SUPERCHARGER" gives you as much as 15 more horsepower from your engine! Gives you the gas economy you've dreamed about for years! Here's why. This Power Booster is patterned after superchargers selling for as high as \$600. Its whirlwind propeller (A) breaks up the raw, unburnt gas that your engine is wasting today... gives you blazing new power from every drop! Its emergency breather valve (B) draws fresh, clean air into your engine... forces that engine to breathe deeper... push harder... pile up more mileage from every gallon you buy! It gives you a "TREMENDOUS NEW BURST OF MONEY-SAVING POWER, just when you need it most—when you flash away from traffic... about up steep hills... pick up speed on the open highway! No wonder dozens of leading car magazines call this the "money-saving discovery of the year." Test this amazing gas-saver yourself—without risking a penny! The thrilling facts are on this page!

gasoline will actually put out that match. But simply mix that same bucket full of gas with the proper amount of air, and you will have enough explosive power to drive a ten ton truck!

The main purpose of this machine is to SUPER-MIX... SUPER-VAPORIZE... SUPER-ATOMIZE your gas in exactly that way! To squeeze the hidden power out of that gas! To mix that gas with much greater volumes of air! To make that gas more explosive in the engine of your car!

No wonder men have paid up to \$600 for Superchargers! What we are offering you on this page is a MINI-SUPERCHARGER—easier to install—less expensive! But still the only power product you can buy with all these tremendous advantages:

1. You can install it yourself, in just 20 minutes, even if you never picked up a tool before in your life! No \$10, \$15 or \$20 mechanic's bills! No drilling, or grinding! You never even touch the inside of your engine!
2. It never needs further adjustments, for the full life of your car! Nothing to go out of order or break down on the highway.
3. It takes up no room in your car... makes no "soused-up" noise! No shifting around of engine parts. No "hot rod" noises that cause embarrassment!



SO EASY TO INSTALL THAT EVEN YOUR 16-YEAR-OLD SON CAN DO IT!

Step 1. Open your hood. Locate Air Cleaner and Carburetor Unit that sits smack on top of your engine. Simply take an ordinary wrench and loosen the two or three bolts that hold carburetor to the engine!

Step 2. Lift up the carburetor. Put MINI-SUPERCHARGER in place. What could be easier!

Step 3. Replace carburetor. Now turn on your engine! And then get in and take the most thrilling drive of your life!

TRY IT ENTIRELY AT OUR RISK This MINI-SUPERCHARGER (U.S. Patent No. 2,409,937) sells for only \$11.95

HERE'S PROOF!

SCIENTIFIC TESTS SHOW AMAZING NEW HORSEPOWER, STARTLING GAS SAVINGS!

Installation of the item was exceptionally easy—less than 25 minutes on both cars. Immediately results show a definite increase of 8 horsepower on the Ford, and 11 horsepower on the Pontiac. The increase in mileage was easily up to 5 miles a gallon on both cars.

—VINCENT LOMBARDI
—New-car Service Manager
WONDERFUL FOR OLDER CARS TOO!

"I can hardly believe my eyes. I tried this out on the family's second car, an older 1949 Plymouth with 54,000 miles on it. We used to call this car the gutless wonder. Now I would venture to say that it has 15 more horses, so we will be glad to discontinue that name."

R. B. Ames, San Pedro, California
"Words cannot tell what it does for a car. My 1949 Chevy now has 72,245 miles on it. We used to call this car the gutless wonder. Now I would venture to say that it has 15 more horses, so we will be glad to discontinue that name."

Eugene Holmes, Walden, New York
"Had it installed in my 1937 Buick. Am getting 18 miles per gallon, and before I was only getting 11 miles!"

N. J. Huston, Lincoln, Maine
FAR BETTER MILEAGE FROM A FEW EAST MINUTES WORK!

"I must tell you about the wonderful results your supercharger has given my

for most cars and only \$14.95 if your car has a special four-barrel carburetor. This is your total cost—there is no installation fee! And, most important of all, we guarantee that you will save this full purchase in gas bills alone—in the first 3 to 4 months that you own this device.

You have nothing to lose! Try this equipment entirely at our risk. It must give you a whole new world of driving pleasure

1954 Ford V-8. On a recent trip to Canada I averaged an easy 22 miles a gallon both going and coming. Now the new power I get is really thrilling!"

Mrs. Jeanette Ellenbogen, Bronx, N.Y.
"I have a 1951 Chrysler Windsor. Before installing your Mini-Supercharger I got approximately 15 miles per gallon. Since installing this supercharger I get as much as 20 miles per gallon."

A. E. Mastimino, Brooklyn, N.Y.
"Received two superchargers for my Buick and Chevrolet. I was well pleased with them. It made a difference on the Buick Roadmaster from 14 to 20 miles a gallon. Would not take fifty dollars for them."

O. J. Bryant, Yellowstone Park, Wyo.
"Increased my mileage from 13 to 20 miles a gallon. And the car has new pep which I haven't seen since it was new."

B. Reiser, Vancouver, B. C.
"Worked fine and dandy. I pulled a two-wheel trailer with full camping outfit. Averaged around 19 miles to the gallon of gas!"

Fred Setts, Mansfield, Ohio
"Worth twice the price. I get 4 to 5 miles more to the gallon. Also more horse power—at least 15% to 20%. Better than 25 miles to the gallon. Would like one for a Studebaker pick-up truck."

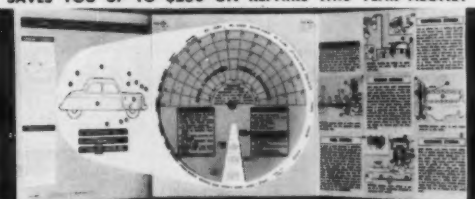
C. R. Dibble, Munnsville, N.Y.
and economy or your full money back! Act today!

LAST CHANCE OFFER!

Our supply of the amazing Dial-O-Magic Trouble Spotter Chart offered in this advertisement is almost exhausted! We are sorry, but this is absolutely the last time we can offer this money-saving Free Gift to you! The MINI-SUPERCHARGER itself is not yet for sale in your neighborhood stores. You have nothing to lose on this No-Risk Offer! Act TODAY!

FREE BONUS!

AMAZING NEW DIAL-O-MAGIC TROUBLE SPOTTER!
SAVES YOU UP TO \$250 ON REPAIRS THIS YEAR ALONE!



Think of it. With a 20-second flick of your finger, you can actually save up to 50% of the money you're throwing away on repair bills right now! You can save up to \$250 this year alone—without special tools, even if you never picked up a screwdriver before!

Here is a complete CAR-REPAIR-MANUAL-AT-A-GLANCE, that tells you instantly what to do when your engine won't start, or heats up, or quatters and stalls. What to do when it leaks water, chugs on the hills, burns oil. What to do when your battery won't charge, your oil pressure drops, your clutch slips, when you're bothered by squeaks, groans or rattles.

Here are professional, 20-second secrets that show you how to prevent rust from ruining your radiator; get quicker starts in winter; keep your engine from overheating even in the hottest weather. How

to keep your upholstery spotless; your brakes in perfect condition; your finish sparkling all year long.

Yes! Simply flick the dial, and instantly you learn how to avoid dangerous accidents in bad weather; check battery and spark plugs yourself and save \$5 tune-up charge; prevent major \$40, \$50 and \$60 repair bills. How to stop engine troubles the very moment they start; lengthen your car's life, add \$150—\$200—even \$250 to the trade-in value of your car!

It's exactly like having a first-rate mechanic at your elbow 24 hours a day! But remember, this is your only chance to get this amazing DIAL-O-MAGIC TROUBLE SPOTTER as a FREE extra gift! An extra added FREE bonus that is yours to keep even if you return the MINI-SUPERCHARGER!

But our supply is limited! ACT TODAY!

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☐ \$14.95 (My car is equipped with a special four-barrel carburetor.)

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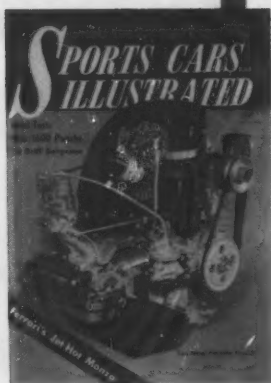
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SPORTS CARS ILLUSTRATED

june 1956
no. 12 vol. 1



This month's cover was in the nature of a lucky break. Griff Borgeson's engine story (P. 38) was in the works and Hoffman Motors had a cutaway Porsche plant. Dan Rubin Ekta-chromed it.

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very sincerely yours

ONE of the mainstays of amateur racing in this country is the production car race in which anybody with a stock road machine can run without getting mashed flat by full-house machinery. In recent months this class has been put in danger of complete extinction by a small group of people who seem to cheat for sheer love of cheating. In one instance an owner belonging to this particular breed poured a total of \$1500 into an MG. Outwardly the thing looked strictly stock but its performance had to be seen to be believed. Quite naturally, the owner took every race he entered — until one day somebody beat him. Quite obviously that somebody was also cheating — all very unethical.

It is time somebody brought this spoilsport activity to a screaming halt. It isn't an easy task since a well-hidden modification requires that the entire engine be field-stripped and thoroughly checked by someone who knows the ins and outs of the hidden hop-ups. But if stock classes are to continue, both in sports car road racing and in drag meets of any description, the hidden-hop-ups must be spotted.

To this end, we assigned Gene Jaderquist to look into the matter. He has done so with great thoroughness. His story will hit the stands in SCI just as the season hits full swing in June. It will form a guide that every technical inspector should clip and carry in his hip pocket. It is not printed as a guide to the would-be cheater but as a method whereby the gent who plays it straight can spot the man who is spoiling things for everybody else. It is highly recommended reading.

• • •

Another piece of recommended study for those who really want to find out what makes things go will be found on pages 32 through 37 in this issue. Karl Ludvigsen has taken the potent Ferrari 750 Monza apart, piece by piece. We can say without doubt (we showed it to Ferrari experts) that this is the most exhaustive piece of literature available on Enzo's fantastic four-barrel and this includes Ferrari factory literature. With it, on the center fold, is the start of a new series of SCI exclusive cutaway drawings by C. O. LaTourette. The one shown is the Monza with which Ernie McAfee mopped up competition on the West Coast before he got his new 4.4 liter Monza six. We guarantee that the new series will delight even the most sharp-eyed reader.

• • •

For those who prefer a lighter diet, we are starting a series on the sports cars and classics of yesteryear — but with a difference. Instead of trying to prove that the sports car of the past could mop up in today's rugged competition, our writers have taken a realistic approach. Nothing is taken away from these boomers from the past — they were, and still are, excellent automobiles. But they did have their faults as well as their advantages. A case in point is the Morgan three-wheeler which virtually owned its competition class in the Twenties and Thirties. Dennis May takes you for a series of rides both wonderful and backbreaking starting on page 18. Next up is the Austin Seven, the greatest car ever designed on a pool table.

• • •

Two months ago we promised that SCI's readers would see a lot more of the new backyard boomers — the ubiquitous specials now making things rough for the best of the factory-built machinery in competition. Next month we begin the introductions with a breakdown of Candy Poole's Crosley-powered PBX special, meticulously prepared little machine that literally owns classes H and G on the East Coast, a province formerly owned by smaller and very costly Italian cars. Karl Ludvigsen has gone into the PBX with the same degree of thoroughness used in this month's Monza report. Don't miss it!

— john christy

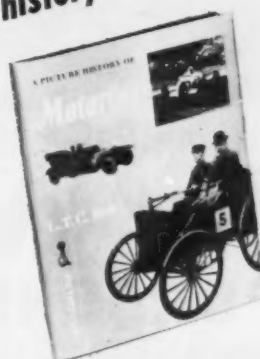
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JUNE '56



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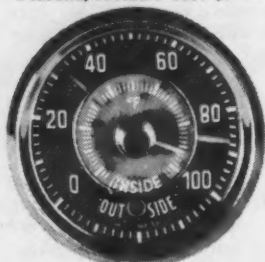
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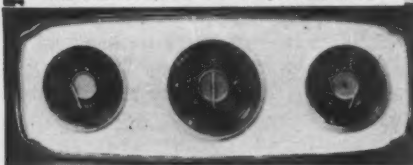
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letters

hot jag

Dear Sir:

I have just finished reading your new issue of SCI and I like it immensely. The technical portion reminds me of the "Auto Car," which I have always regarded as tops.

At present I have a Mark VII Jaguar '52. She is a beautiful piece of machinery but not made for slow traffic, which one will invariably meet in large cities. The motor will heat rapidly in hot weather and begin to boil if you don't get on open highway soon.

The ignition timing and carburetion have been adjusted to the manual.

What steps can be taken to cure this fault?

Sincerely,
Dr. C. M. Walters
Camden, Arkansas

This is a common failing of the earlier Jaguar models — the roadsters as well as the Mk VII sedans. There isn't much that can be done about it except to put shielding around the radiator so that ALL the incoming air is ducted through the core. Providing premium fuel is used as standard operating procedure, ignition settings a bit higher than those recommended can be used. The exact amount is dependent on the condition of the car and the amount of carbon deposited in the combustion chambers. The final setting is best made on a chassis dynamometer for peak results. — Ed.

blower trouble

Sir:

Can you offer assistance in the following? I have about exhausted all sources available to me for advice, e.g.: the Judson Supercharger people, the SU bunch in England, etc.

I have installed a Judson blower on my MG-TD (1951). It is equipped with one SU 1½ inch carburetor containing originally a .100 inch jet with needle "RA." The set-up is too rich for this altitude, where we operate between 5000 and 10,000 feet regularly. The Judson people advise an "RB" needle (which is leaner in the lower ranges but far richer in the upper ranges); the SU people advise using .090 inch jet, which starves the damned thing out.

The problem is that no one has run an MG out here without dual carbs and I can't determine what would be the proper jet-needle set up on an MG with a single 1½ inch SU on it.

Thanks in advance for any assistance

you can offer by way of direct answer or referring my problem along the line.

Sincerely,
William A. Glassford
Denver, Colorado

For one thing, a blower installation must be given its final adjustment and setting by painstaking use of an exhaust analyzer and a chassis dynamometer. It takes work but it's the only way to do the job right.

Under normal circumstances the Judson recommendations would be advisable, but in your high-altitude area the situation changes somewhat. A mixture near normal in the lower ranges and richer in the upper ranges is generally the best since the higher the pressure developed the richer the mixture must be to keep from burning valves and holing pistons. The 1½ inch SU would do the job at normal altitude but in a higher altitude the problem is one of air density rather than lbs. per square inch pressure, particularly in view of the blower. A 1½ inch carburetor would be a better choice, using Judson's figures. Further, installation of the AEG 122 camshaft is indicated, using "red" Mk II valve springs if these are not already on the car.

An alternative is to switch to the Solex unit now used on the Porsche Super. This unit carries an accelerator pump and is a simpler unit to keep in adjustment and to set. Since it is a downdraft carburetor the Solex will require some adaptation through an elbow which can easily be fabricated from tubing by any of the many specialty shops in your area. If you can get him interested in MG's and blowers, Bill Kenz, of streamliner fame, is about the best man in the area for turning out real goin' machinery. A further item, if you care to go that far, (and in your case it's advisable) is exhaust tuning. — Ed.

The Editor, SCI

As to your article on tuning the Porsche (August, 1955) you stated that lowering the Porsche keeps the rear end stable. I have a VW and would like to know how this can be done. Could you please send me some information along this line.

Thank you.

Sincerely,
Gilbert Stort

Slacking off the rear torsion bars to produce a slight negative camber helps to stabilize both the VW and the Porsche. — Ed.

rapid bird

Sir:

Happened to pick up the January

'56 issue of your magazine and it made sufficiently good reading to warrant the year's subscription.

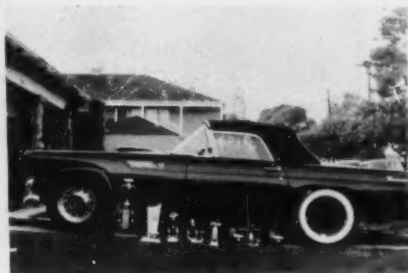
Noticed with interest the article on Bill Frick's Thunderlac. Here in southern California we are making "T" Birds run that fast with modified engines and at a considerable lesser cost than the "\$2000" noted in your article. My own T-Bird, with full street equipment, except for open pipes and slicks, turned 108.69 at Santa Ana Drag Strip, February 5, '56 (second run, Car No. 81). Elapsed time was 13.03. I might add that the car is as smooth as stock for street use and will idle at 10 mph in high gear.

The "go" is provided by an Edelbrock modified engine and McCullough supercharger blowing through an Edelbrock "triple" manifold. Total engine cost was approximately \$1300 and required only one week's time for modification and installation.

Enclosed is picture of car and the eight trophies picked up at the local Drag strips in the last seven months.

Also am enclosing a check, \$3.50, for my subscription.

J. L. Peters
Hollywood, California



oh?

Dear Sir:

What is it with you guys always flipping over some of those foreign cars that couldn't go fast enough to catch a cold in the head. I got your mag by mistake when I told my brother to get me MECHANIX ILLUSTRATED and he bops in with SPORTS CARS ILLUSTRATED. So I figured I should read it before I throw it out so I read where you clowns think some little English shorts are the Screaming End and you don't think Detroit has done anything good since Columbus got lost. I will take a Cad or a Chrysler and out-drag any of those over-fed scooters of yours. Why don't you change your title to DETROIT CARS ILLUSTRATED and print stuff about the greatest, and I mean DETROIT!

Clinton C. Williams, Jr.
Detroit, Michigan

You've got the address, Junior. Drag

that lump around and OUT. We're here five days a week. — Ed.

dohc crosley

Dear Sir:

Say, I would like a little help. I have a Crosley built for competition and it's just the thing for the poor man's race car — but, I just can't find the right set-up for a winner in Class H.

What I would like you to do for me is find dual overhead cam set-up. Or is there such a thing?

Thanks,
Dan Kuist
Los Angeles, California

Coming up very soon is a complete breakdown of Candy Poole's PBX Crosley Special — It's a winner! Then there's Harry Eyerly's Crosley out in Oregon and Dr. P. J. Young's DOHC Crosley in Los Angeles. You might check with Doc and see if he has an extra set-up. His address should be available from the California Sports Car Club, 4949 Hollywood Blvd., Los Angeles. — Ed.

hop-ups

Dear Sir:

I was wondering if you had any plans, books, etc., on hot rods. How to hop a car up, etc. If so please let me know. Thank you.

Bill Shea
Moose Jaw, Saskatchewan, Canada

Just keep reading the magazine, Bill hop-ups coming up. — Ed.

barge or bolide?

The Editor: SCI

I have read ridiculous letters to SCI before, but the one from the driver who runs VW's off the road and the one from the gent who thinks Detroit is going to fold, take the cake. (March '56) I think it is only fair to sit on the fence and hit back at the narrow minded, prejudiced, and ego-hungry jokers on both sides. I think it is pretty well agreed that sports cars aren't very practical but loads of fun to drive, while the full sized Detroit jobs are vice-versa. It simply depends on what one wants. Both agility and practicality are equal in my book, so what's all the friction for? I drive both types and find that each one is near perfect for what it was designed for. Let's cut out these senseless letters and remarks that just create friction between U.S. and foreign car owners. They are both good automobiles.

Very truly yours,
Douglas Gardner
Las Vegas, Nevada

Amen. — Ed.

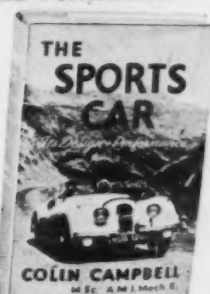
The only permanent reference book covering the contemporary sports car!

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GLOSSARY OF TECHNICAL TERMS

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Inspecting dip stick reveals consistency of oil which may be heavy in order to muffle a slapping piston or a loose bearing. Also, if oil feels gritty between the fingers, a ring job may be in order.

Should you buy a used sports car



By BOB BEHME

RUSSIAN roulette is no game for cowards. Putting a gun to your head with one bullet in the chamber and a five or six to one chance of survival may not take brains but it takes guts, of a weird sort. There have been so-called experts who say that buying a used sports car is tantamount to Russian roulette; that you take the same chances and need the same kind of dumb luck.

They're wrong. I've talked to experts in all phases of the sports car field. I've talked to engineers, dealers, designers and buyers. They disagree.

The graying, sandy-haired dentist in the mid-west, the young college student in California or the salesman in New York who recently purchased used sports cars did so because they wanted to own foreign cars but couldn't get the model new or couldn't meet the price. They displayed the same reasoning Mr. Average Public displays when he peels off a "low down payment" to pick up a two-year-old Detroit buggy: when you can't get a new one, get the best used car you can buy.

Chances of getting somebody's worn-out plaything are much less than you think; less than the chances you take when you buy one of the tubs off the nearest "Honest John" lot specializing in American cars, according to one independent marketing consultant.

"It is the original owner, not the dealer, who determines

a car's condition," he told me, "and sports car owners generally keep their cars in top condition."

"But the real point," a potential customer told a mid-west sports car dealer recently, "is that *all* sports cars are raced."

"Is that why you want a sports car?" the dealer asked.

"Well," the buyer admitted, "no. But I'm different."

According to one of the nation's top insurance firms 95 percent of the foreign car owners are similarly "different". Less than five percent of the foreign cars registered in the United States have been raced in competition — even once. The total number of U.S. registered sports cars that have been raced would number less than 5,000, according to current registration figures.

"I've been buying used sports cars for five years," one dealer told me, "and during that time I've handled several thousand sports cars. Less than 30 cars have passed through my hands with any history of racing."

The average owner of an MG, Triumph, Austin-Healey, Porsche or Jaguar buys it because he likes foreign equipment. The dentist from the mid-west told me: "I use my Jaguar for transportation, the same as my neighbor does with his Buick. I drive it from home to the office and back. I'm no more reckless. I drive no faster."

No survey covering the driving habits of American motorists and some two hundred have been recorded to date,

*Here is the answer,
taken from interviews
with experts in all
phases of the
sports car field.*

car?



show any difference in habits between the American who pilots a heavy piece of Detroit equipment and the one who chooses the lithe European machine.

"Racing is out of the picture for the average sports car owner," said a sports car club official. "The general run of our members own one sports car. Each has sunk a large portion of his income into it and he'd rather baby the car than take chances."

If racing is out of the picture for the owner, it is out of the used sports car picture, also.

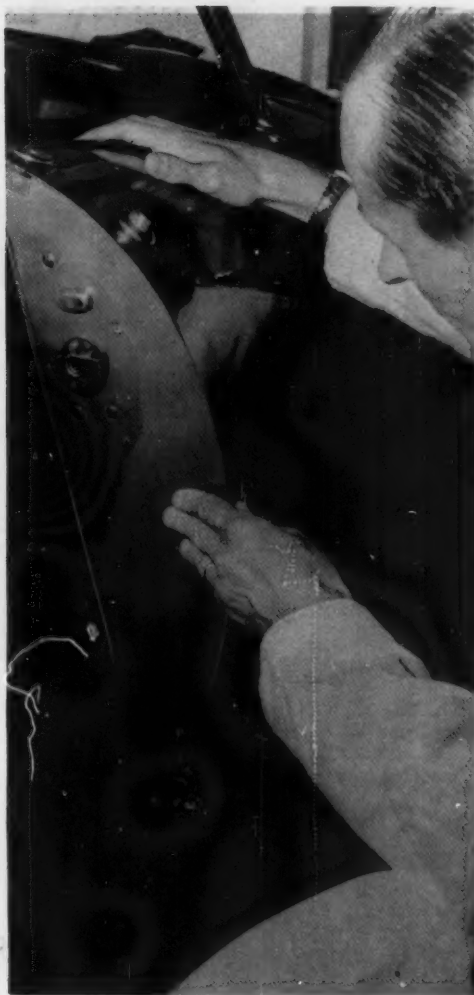
The owners of recently acquired used sports cars I talked with indicated they purchased because of price or model. Often a prospective buyer **MUST** buy a used sports car to get the model he likes. Some of the most popular models are no longer manufactured. They're available only from the used car market.

"The MG is an excellent example of this," said a Pacific Coast MG dealer, "Many think the MG-A is a top quality car, fast, well-built and beautiful yet lots of enthusiasts prefer the classic lines of the TC, TD or TF. To get these, they've got to buy a second hand car.

Another example is the Sunbeam Alpine. The young college student from California told me: "I've long treas-



Test transmission before leaving lot for tightness, then again after the car has been driven. If transmission feels loose after road test, beware, it may be due for repairs.



Check door alignment in vertical and horizontal planes. Misalignment of doors may indicate body racking — a sign of age and hard use.



Test excessive play in steering box and linkage by rotating steering wheel slightly in both directions until front wheels are just laterally moved. If play exceeds inch and a half, have dealer repair it.



Small dents and scratches shouldn't deter the purchase of an otherwise good car. Repairs can be done at the car-lot's shop or at your favorite garage.



Signs of a front-end collision can be detected on the body metal behind the bumper brackets. Small points such as this are often overlooked by adept body shops.



Chrome and grille parts should be checked for corrosion. Blistered chrome could mean the car has been outside in bad weather or near salt water.

"...Less than five percent of the foreign cars registered in the United States have been raced in competition..."

Trunk braces should be inspected for signs of repair. Welded braces could mean car has been in accident, which could also mean distorted frame.



ured this rally winner; wanted one badly. Rootes no longer makes them. If I wanted one I had to buy it used."

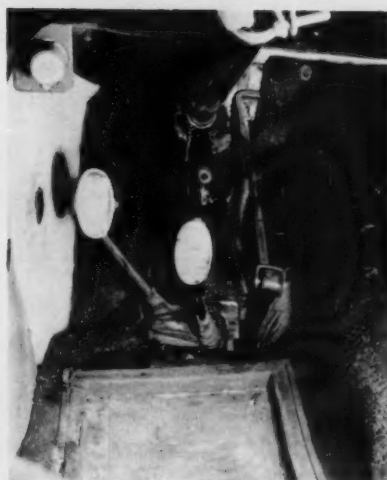
Thus far this factor has not been a deterrent. The used Alpine market is booming.

If there is no preference involved in model, the decision between new and used will be a monetary one. That is up to buyer, banker and pocketbook.

"There is no dealer in the country," said the New York salesman, "with the possible exception of Mad Man Glockenspiel, the Used Car King, who would argue the case of used car versus new. There isn't any case. If you can afford a new car, buy it. If not, don't deny yourself the pleasure of a sports car. Do as I did, buy it used."

There are many factors which favor the purchase of a sports car. One important consideration is depreciation, the decrease in value as a car ages and is used. Depreciation

Inspect hood for proper alignment and action of hood hinges. These check points often reveal body racking or distortion due to collision. Check under-chassis for further evidence.



Condition of brake pedals and floor mats gives indication of true car mileage. This MG shows a well worn interior which evidences neglect of care or heavy use.

Scuffing, cupping or uneven wear on inner or outer perimeter of tread indicates bad alignment, or worn parts.



Peeling, flaking or reticulating paint can mean costly refinishing. Before buying, demand repainting.



Weatherstripping should be in good condition to keep out unwanted weather. Check stripping at windshield and around doors.



is more stable for the foreign car than it is on Detroit machinery. A general rule which runs, "the more money you pay for a car the more it will depreciate," drops in favor of the foreign car.

In Los Angeles, which is rapidly supplanting Detroit's Livernois Avenue as the used car pulse of the nation, 1955 Detroit cars which sold for \$3000 to \$3500 are going for \$1900 to \$2400. Drops as much as \$2000 have been recorded. One dealer in town is consistently advertising 1955 models, with low demonstrator mileages, for prices highlighting \$1900 depreciation.

Used sports cars fare much better. The price you pay for a one or two year old sports car will be close to the price you can sell it for one year later. Initial depreciation is less on foreign equipment and remains more stable as the years pass.

A 1954 Austin-Healey, which cost \$3100 new, recently sold for \$2300, and it was a bargain. There are few on the West Coast for less than \$2200; most cost between \$2400 and \$2500. They've depreciated less than \$1000 in two years. Put that up against the Detroit cars which drop \$1900 in one year!

The MG is another example. In 1955 the new prices ranged between \$2100 and \$2400 depending upon the equipment installed. Used '55s are selling for \$2000. 1954s bring \$1500. MGs from '52 and '53 go for \$1200. A few '52s in need of repairs go as low as \$1000 or \$900. That's about 50 percent depreciation in four years.

It may mean you will pay a higher price for a second hand sports car, but when you're ready to sell and move up to a new sports car, you'll get back a higher percentage of your investment.

#



Small dents and scratches on the paint surface should not discourage the purchase of the car providing all else is satisfactory. Check list: fair.



Condition of pedal pads and matting bear out accuracy of odometer reading. Replacement of such may mean prodigious mileage. Check list: poor.

used car buyers' check

There are many ways to investigate the condition of a used sports car. Some checks can be made directly on the used car lot. Other answers come when you road test the car.

These are points you can check on the used car lot and during a short road test. If there is any doubt in your mind about the car you want to buy, check deeper into its condition. Many foreign car garages offer a "used car inspection" service. For a few bucks (usually \$10) you can get a trained mechanic to evaluate the remaining life of every moving part of your prospective purchase.

In Hollywood, Arnold Sutton, a top sports car mechanic, performs a check of more than 30 points. He grades them on a scale of 1 to 6, for the information of potential buyers. Here is his rating system:

1: the part has 100 percent remaining life.

2: " 80 " " "

3: " 50 " " "

4: " 20 " " "

5: " has terminated useful life.

6: " is dangerous and must be replaced

immediately.

On the Lot Check:—

Good ☒ Acceptable ☒ Poor ☐

GRILLE: ☐ Look for possible corrosion, a sign that the car has been stored outside or near salt water. It could mean decayed body panels. Check the front for dents or other signs of front-end collisions.

BUMPER BRACKETS: ☐ Body re-builders can usually remove all traces of a serious collision, but often forget to straighten the body metal which surrounds the bumper bracket holes.

TOP: ☐ If the top is a cloth convertible top, be certain it is in good condition: that the bows mesh properly. Be certain that the perimeter, the cloth which closes to the windshield and windows, seals properly.

PAINT: ☐ Check for flaking, reticulation and cracking. Once a car's finish starts to deteriorate it will be but a short time before it needs new paint.

DOORS: ☐ These should be checked for proper alignment: both horizontal and vertical alignment. Check the door latch. Look at the weather stripping. It is never painted at the factory. If the weather strip has been painted, and the car is a recent model, be wary. A car given normal wear should not require repainting for three years.

BASE BODY PANELS: ☐ The first signs of rust will show here. A car with rusting panels can become an expensive hobby. Repairs are costly.

INSTRUMENT PANEL: ☐ Be certain the car has all stock instruments and that they are in working condition.

PEDAL PADS: ☐ Excessively worn pedal pads are signs of high mileage and hard use. It takes 40,000 miles of hard driving to wear clutch and brake pedals; new pads on a "low mileage" car should mean they've been replaced because the odometer is lying.

TRANSMISSION-DIFFERENTIAL: ☐ These points can give you a good idea of the mileage that's actually on the car. It takes 50,000 miles to build up a 1/2 inch cake of grease on these points. A low mileage car that's been steam cleaned might have been cleaned to hide more than a normal amount of grease cake. Check such a car closely.



Worn or torn interiors denote either long hard use or perfunctory attitude toward maintenance of general appearance. Check list: fair to poor.



Test all safety items such as brakes, lights, horn, and hand brake. If sure handbrake holds on steep hill with car facing ascent. Check list: good.

list

FLOOR MAT: ☐ Wear here has the same implications as the pedals.

SEATS: ☐ Springs and upholstery can tell you much about the condition of a used car. It takes a lot of sitting to break coil seat springs. A "low mileage" sports car with saggy springs in seat or back rest, could be a hint that something is rotten in Denmark. A car with torn upholstery could signal improper care. If an owner will let the upholstery go to pot, think what he may have done with the engine!

STEERING WHEEL: ☐ Check for excessive play. The steering should be perfect before you buy the car. If something's wrong have it repaired before you take delivery.

OIL DIP STICK: ☐ Disreputable dealers sometimes try to hide piston play by dosing the engine with heavy oil. If the oil clings to the dip stick like a ticket to a ticket taker at a football game, don't buy the car.

BATTERY: ☐ Check for corrosion around the battery case. Acid can eat away body panels, causing expensive repair bills. Worn or frayed battery cables should be replaced before you buy the car.

ELECTRICAL WIRING: ☐ Worn or loose terminals or frayed loom could signal needed repairs and poor maintenance.

RADIATOR: ☐ Dented or insect-clogged screen could mean an accident or poor car care. When you've checked these points put the car on a hoist. The less pretty undersides can tell you a great deal about the general condition of the car you plan to buy.

FRAME: ☐ On the Hoist Check: welded or cracked frames usually mean the car has been in a blitz-sized crack-up. Don't buy such a car until the frame has been repaired and you know the alignment is O.K.

BODY BRACES: ☐ Check for signs of an accident. Broken or welded braces mean the car has been hit — hard.

WHEELS: ☐ Move the wheels laterally to check for wheel play. Excessively wheel play could mean worn bushings and bearings. Have the defect repaired before you buy the car.

TIRES: ☐ Tire scuff — either inside or outside tread wear — means poor alignment. It should be repaired before you buy the car.

STARTING: ☐ When road testing, check these points: a hard starting engine could be caused by ignition or fuel system troubles. Compression could be poor. It is best to have a competent mechanic test such a car before you buy it.

TRANSMISSION: ☐ Try the gear shift lever, in all gears, before you drive it. Then, try them again after you've driven a few blocks. If the transmission has loosened, it may need costly repairs.

CLUTCH: ☐ If you have to stuff your foot through the fire wall to change gears, the clutch is shot. Make the dealer repair it before you buy.

BRAKES: ☐ These should work quickly, without delay and without grabbing or squealing. The hand brake should be in good condition.

ACCELERATION: ☐ This procedure is not recommended for a purchased car, but it can give you a quick, accurate picture of the engine's useful life. Shift into high at 25 mph then floor-board the foot throttle. If the car coughs, protests, then slowly moves forward, the engine is ready for the scrap heap. If it pushes you back to the seat and growls forward, chances are the engine has a good many miles of pleasure remaining. #

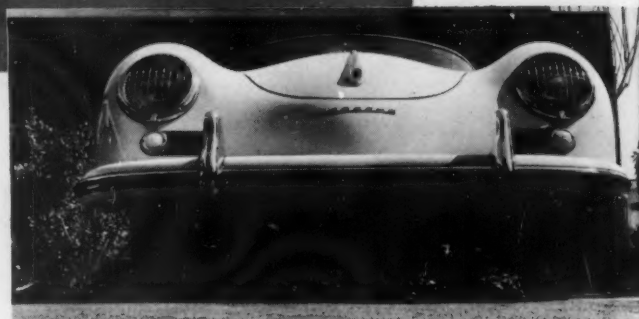


Photos by Griff Borgeson

"...one of the most significant technical accomplishments of our time."

THE NEW Porsche 1600 is one of the world's truly fine cars. Every hour you spend with it adds to your appreciation of the excellence of its design, workmanship, and performance. It's a supremely good machine in traffic or on the open highway and a world-beater on winding roads. It makes you hunger for a handy Alp to slide up and down all day. As a precision instrument for maintaining high average speeds regardless of terrain, it's a revelation.

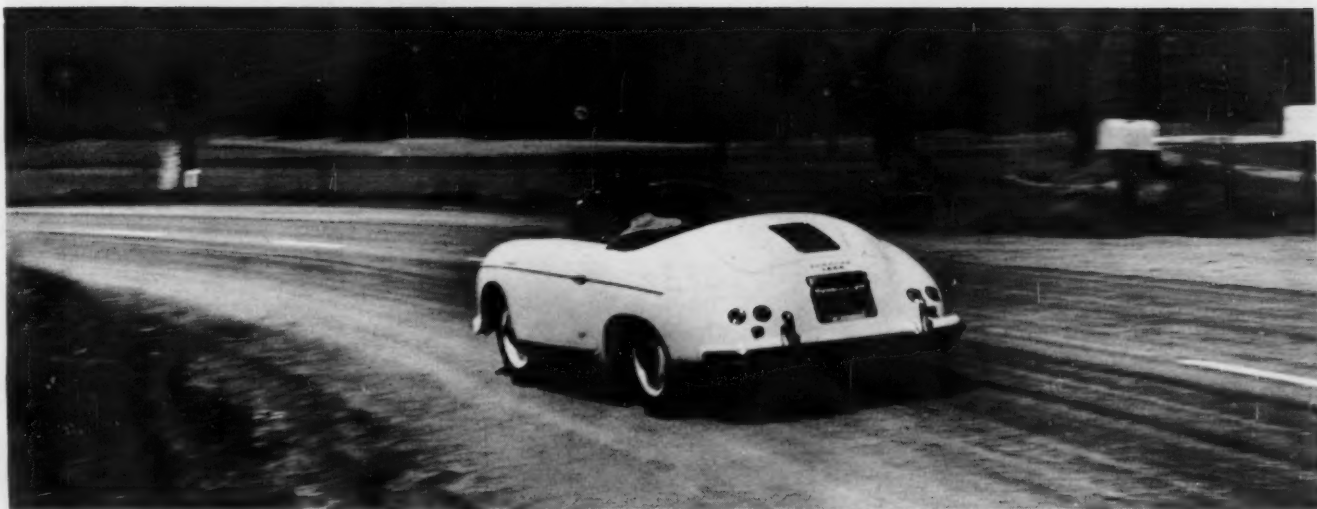
At no increase in price over its 1500 cc predecessor, the 1600 offers six percent increases in horsepower and displacement and a five percent increase in torque. Calculations based on the car's pulling power and tractive resistance indicate that the actual output of the 1582 cc, 96.5 cubic inch engine is more, not less, than the factory-advertised 70 bhp figure. The Speedster, as the roadster model is called, lists at \$2995 at U. S. port of entry and can be driven away for about \$3200 after all fees and compulsory options have been cared for. You don't get much iron as such for your money but you do get an engineering masterpiece in the full, literal sense of the term.



Rear engine design of Porsche keeps the Stuttgart machine clean and uncluttered in front. Bumper is protected by inserted rubber strip.

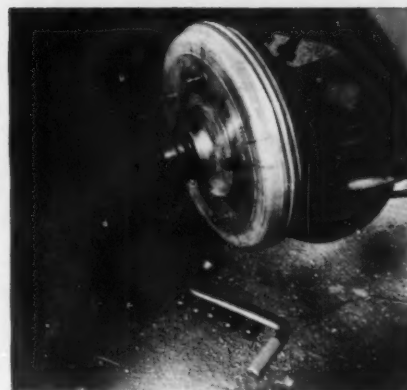


Sparewheel, fuel tank, jack, tools, and space for small articles of luggage ride up forward of the driver. Stone guards protect headlamps from flying road debris.



Porsche's tail slides toward outside of bend on standard test curve. This curve is not on a slope despite optical illusion, road is dead level. Car's driftability helps it achieve high average speeds.

Brakes of early Porsches fell short of perfection until 1952 when the larger bimetal drum with two-leading shoes was made standard for all production cars. The larger drum, shown here, makes stopping distances short without locking the wheels.



Even though this is a country in which the fact or illusion of size is often a criterion of quality, enough Americans dig the Porsche right now so that, if not another order were placed, the factory could continue to operate at full tilt for at least a couple of years. The cars are *very* difficult to come by. For example, the last shipment for the Southwest consisted of ten 1600's to be doled out among 38 howling dealers. I managed to obtain a test car only by the grace of the deity and film producer Manny Post, whose passion for Porsches caused him to add Europa Motors of North Hollywood to his properties. Mr. Post handed me the keys to his personal, spanking new Speedster and said, "Don't let the low mileage inhibit you. Just get the lube oil warm, then go ahead and stand on it." His instructions were obeyed to the letter and with profoundly educational results.

In a road test last month I mentioned that I am not an exponent of the controlled slide. Now, thanks to living with the Porsche for a few days, I am.

I don't like to push my driving prejudices at others but it's necessary here to illustrate the point. In a car with a mushy, tentative road-bite I drive with caution born of doubt. In a car with a tenacious, glued feel I'm so grateful for the being-on-rails sensation that I have no desire to exchange it for a technique of skidding that would only serve a purpose in competition. And then along comes the Porsche.

Its engine, of course, is mounted at the rear, aft of the pendulum-type rear axle. Our test car, with the fuel tank about three-quarters full, weighed 1680 lbs. and almost 58 percent of this bore on the rear wheels. The springing is typically Porsche, by laminated transverse torsion bars acting through trailing links at the front and solid, adjustable transverse bars at the rear acting through trailing arms. The unorthodox weight distribution and suspension give the car handling qualities that are rather unique. At slow speeds it handles quite normally in turns, and the feel is on the moderately "glued" side. Then, at only slightly higher speed, its character changes entirely. In place of a four-square chassis bite on the road you have the rear end of the car slipping toward the outside of the curve.

Most of us have an instinctive aversion to this sensation which, in the average car, means you've lost it. When it happens to you in a Porsche for the first time you're more than likely to be startled if not plainly scared. This rear-end slip is *not* like that of a "glued" chassis when it hits a patch of dirt—biting firmly, then sideslipping for a split second, then snapping into the rails again. The Porsche does not break away suddenly. It drifts from inside to outside in a gentle, casual way. The sensation is very much like cornering on half-inflated tires.

Is this bad? Only if you believe it is. Is it good? Emphati-



In moderate turns, the Speedster is slipped through under power all the way, directing the car by a combination of rear-wheel or four-wheel slip and throttle.

cally yes, if you accept and understand it. You can corner a Porsche in a sedate and conventional manner if you choose. Just as easily, you can wag its tail and get through short, tight-radius turns with amazing nimbleness and speed. In more open curves you can drift all four wheels and the smooth transition from bite to slip is almost imperceptible.

The slip effect is as though the car were on a pivot at the front end. You pop the Porsche into a tight turn, deliberately flip the rear end outward so that the car is perfectly aimed to leave the turn, then head for the straight under full acceleration. In turns that are not too tight you can steam through under power all the way, directing the car by a combination of steering wheel, rear-wheel or four-wheel slip, and throttle. Thanks to these characteristics and a set of magnificent brakes the Porsche is hilariously controllable and agile.

PERFORMANCE PORSCHE 1600 SPEEDSTER

TOP SPEED

(At sea level, with 1.5 mile approaches to ¼-mile timing traps.)

Two-way average97.3 mph

Fastest one-way run ..98.1 mph

ACCELERATION

From zero to:

20 mph 2.1 secs.

30 4.6

40 7.1

50 9.5

60 13.3

70 16.6

80 20.7

Standing ¼ mile 18.8

Standing mile 49.6 (72.5 mph avg)

SPEEDS IN GEARS

Recommended max.:

First 15 mph

Second 49

Third 71

SPEEDOMETER CORRECTION

20 mph indicated 19 mph actual

30 27

40 37

50 46

60 56

70 66

80 75

90 84

FUEL CONSUMPTION

Hard test driving, actual 18.9 mpg

Moderate cruising, estimated 28 - 30 mpg

SPECIFICATIONS

POWER UNIT

Type Opposed four, air cooled

Valve arrangement Vee-inclined, pushrod operated

Idle speed 900 rpm

Maximum bhp 70 bhp @ 4500 rpm

Maximum torque 82 lb. ft. @ 2700 rpm

Piston displacement.. 96.5 cu. ins./1582 cc.

Bore and stroke 3.25 x 2.91 ins./82.5 x 74 mm

Stroke-bore ratio 0.89 to one

Compression ratio 7.5 to one

DRIVE TRAIN

Transmission ratios... I - 3.18 - 1

II - 1.76 - 1

III - 1.13 - 1

IV - 0.815 - 1

CHASSIS

Suspension, front Porsche trailing links and transverse laminated torsion bars

Suspension, rear Swinging half-axes, adjustable transverse torsion bars, trailing arms

Shock absorbers Tubular double-acting

Steering wheel turns.. 2¼, lock to lock

Turning diameter 33 feet

Brakes Two leading shoe front hydraulics; ribbed light alloy drums, cast iron liners

Brake lining area 124 sq. ins.

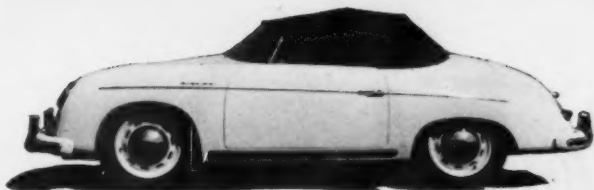
Wheel studs 5½-in. studs; 8 in. circle diameter

Tire size 5.00 x 16

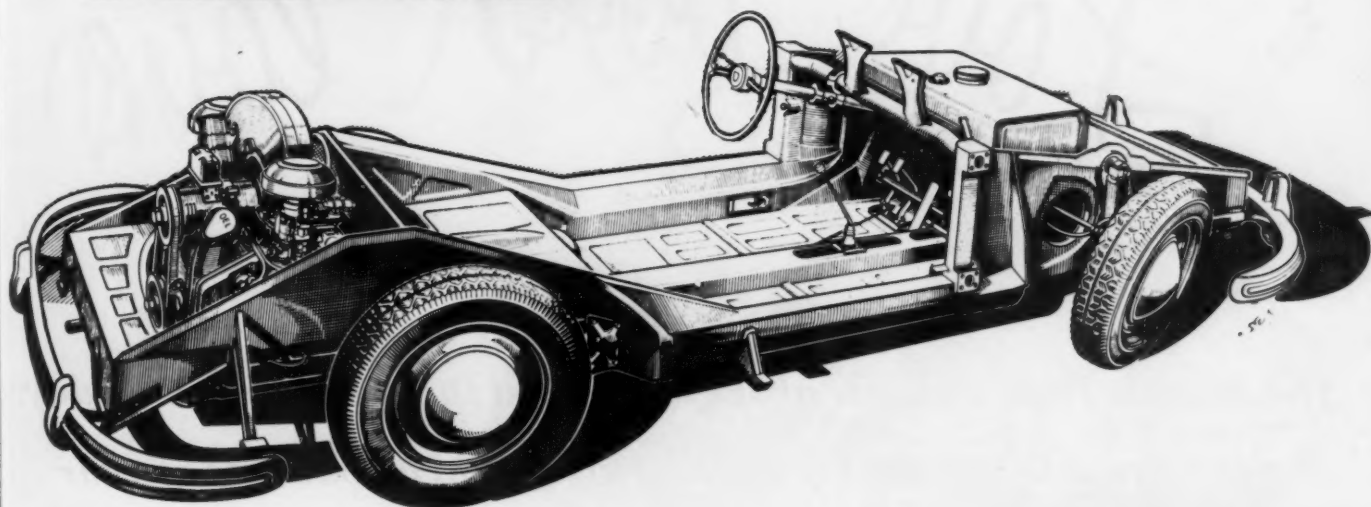
Rim width (outside) .. 4.6 ins

Wheelbase 83 ins.

Tread 50.8 ins. F/49.2 ins. R.



Profile view of Porsche speedster with top up. It can be erected in half a minute by one man.



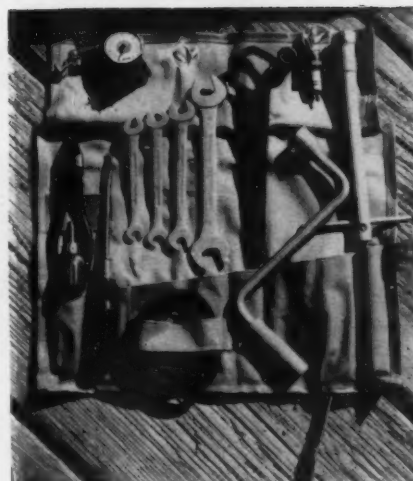
Frame of the Porsche is constructed of pressed steel welded in box section form. Longitudinal members are built up as large thin-walled sections which provide maximum resistance under moments of stress. Tunnel in middle of frame is passage for gear shift rods, and other control cables.

GENERAL

Length	155 ins.
Width	65 ins.
Height	51 ins.
Weight, test car	1680 lbs.
Weight distribution F/R	42.5/57.5

RATING FACTORS

Bhp per cu. in.72
Bhp per sq. in. piston area	2.11
Pounds per bhp, test car	24.0
Piston speed @ 60 mph	1518 ft. per min.
Piston speed @ max. bhp	2185 ft. per min.
Brake lining area per ton, test car..	148 sq. ins.



Tool kit. TOP: Tire gauge; rubber spark plug sheath; and spark plug. CENTER: Cutting pliers; stubby screwdriver; screwdriver; four metric-sized wrenches; generator pulley wrench; lug wrench; and spark plug wrench. Extra fan belt is strapped to tool kit case.

Drifting this ultra-light car seems to have no undue effect on tire wear. Charging down a steep mountain road containing 63 hairpin switchbacks produced the impression that the 1600 spent all its time on the tires' sidewalls. But at the bottom I got out and checked the German Dunlops and found that the shoulder where tread joins sidewall was as sharp as when new. Incidentally, marks were made on the rims and sidewalls at the beginning of the road test. In spite of much heavy acceleration and braking, there was no slippage of the tires on the rims.

It's clear that the Porsche's delightful "driftability," which helps it to achieve high average speeds, impressed me as the car's most spectacular feature. But it's a distinguished car in many other ways.

In spite of its light weight the 1600 is rock-solid and stable at all speeds. There is scarcely any perceptible difference in sensation inside the car between speeds of 20 and 80 mph. Above that, our test machine's suspension became slightly harsh, possibly because it was too new for lubricant to have fully penetrated the leaves of the laminated front torsion bars. In common with the ride of many continental cars, the 1600's is slightly firm on a good road surface and scarcely different on the very worst surface.

The steering, like most of the Porsche's other organs, is superlative; the *right now* kind—quick, light, positive, and completely devoid of play. It is very sensitive to tire pressures. When I received the test car it was carrying "town" tire pressures of 20 lbs. front and 26 lbs. rear. While this

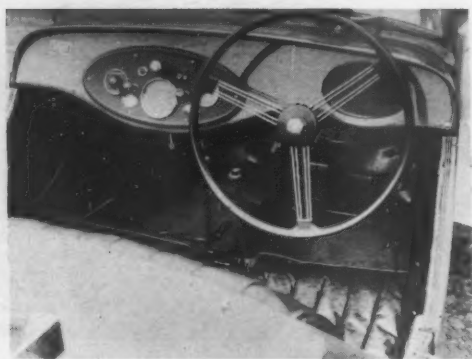
(Continued on page 56)

JUNE '56

"Love me, love

The Morgan Trike was just about the hottest thing going—in its day. The only trouble was that if you had more gold on one side of your jaw than the other you couldn't steer it.

by DENNIS MAY



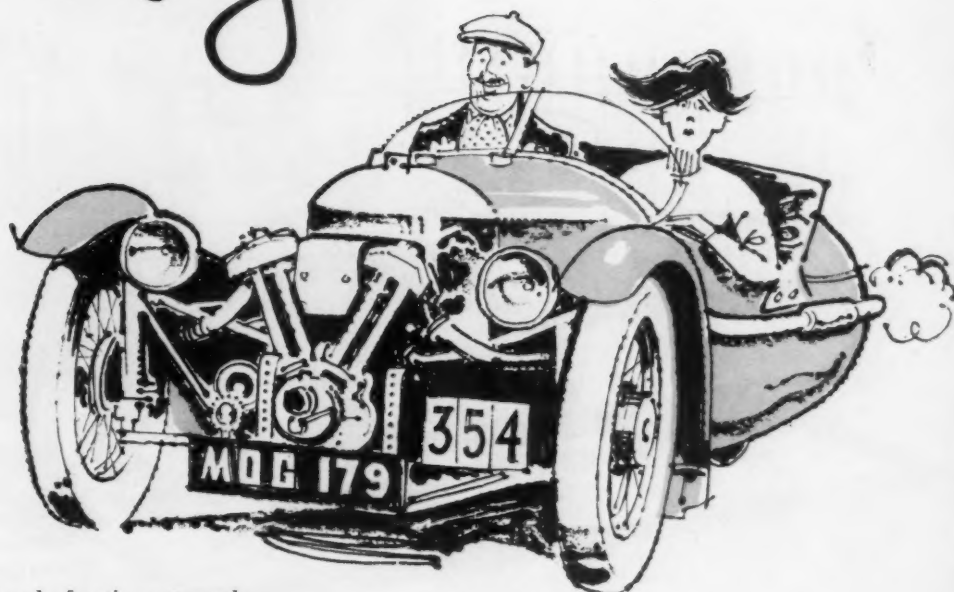
Cockpit of a later "Trike" equipped with a foot throttle and ignition switch. Earlier models had hand throttle on steering wheel, and no ignition switch.

THINKING in straight lines was always as natural as breathing to Henry Frederick Stanley Morgan, so he needed no help from slide rules and logarithms in figuring that a high power-weight ratio is the greatest single source of merriment that motoring has to offer. During the whole production lifetime of the remarkable three-wheel car that bears his name (42 years, with two bites out for world wars), this remained his favorite dogma. It was a recipe which, on its dividends in performance and operating economy — mostly the former — sold more than 40,000 "Mogs" between 1911 and 1952. Nearly a quarter of a century ago, H.F.S. Morgan was harnessing 40 horsepower to less than 800 pounds of dry weight — equal to 114 b.h.p. per ton and enough to out-dig the cost-no-object Bentleys and Lagondas of the day.

In the leisurely little Morgan plant at Malvern Link, Worcestershire, England, output of the classic twin-cylinder tricars ceased back in 1948. The issue of the more sedate four-cylinder types continued fitfully for a further four



my Mog^{II}



years, then H.F.S. and his devoted band of artisans turned their undivided attention to building four-wheel sports cars. These somewhat resemble the MGs of the Perpendicular period and are now the only vehicles in active production carrying the Morgan trademark.

Ownership of a two-cylinder Morgan trike in any of its beefier forms, from the early Grand Prix model to the latterday Super Sports, has always hovered between a hobby and a cult, with a lean towards the latter. You can sum up the philosophy of this starry-eyed elect in five words — "Love me, love my Mog." Even today in Britain there are some thousands of followers of the true faith, and the virile Morgan Three-Wheeler Club preserves its traditions from generation to generation. It has over 600 members, of whom about 70 percent own two-cylinder models.

There will be a time and a place elsewhere in this article to arraign the bugs in the Malvern woodpile, but this isn't it. First, let's run a finger down the credit side of the ledger. An ample page it is, too.

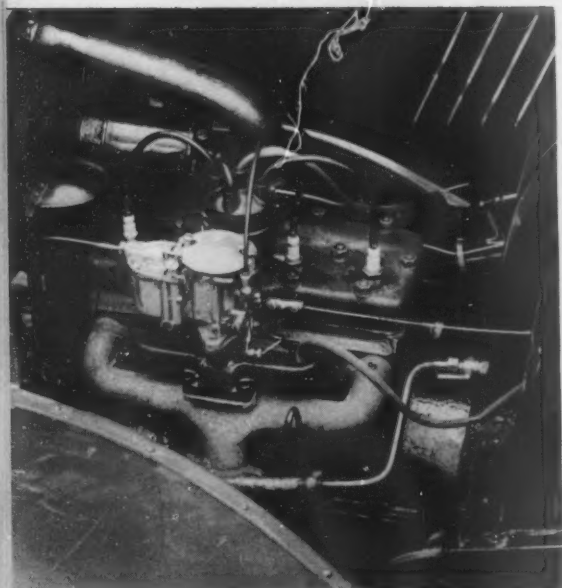
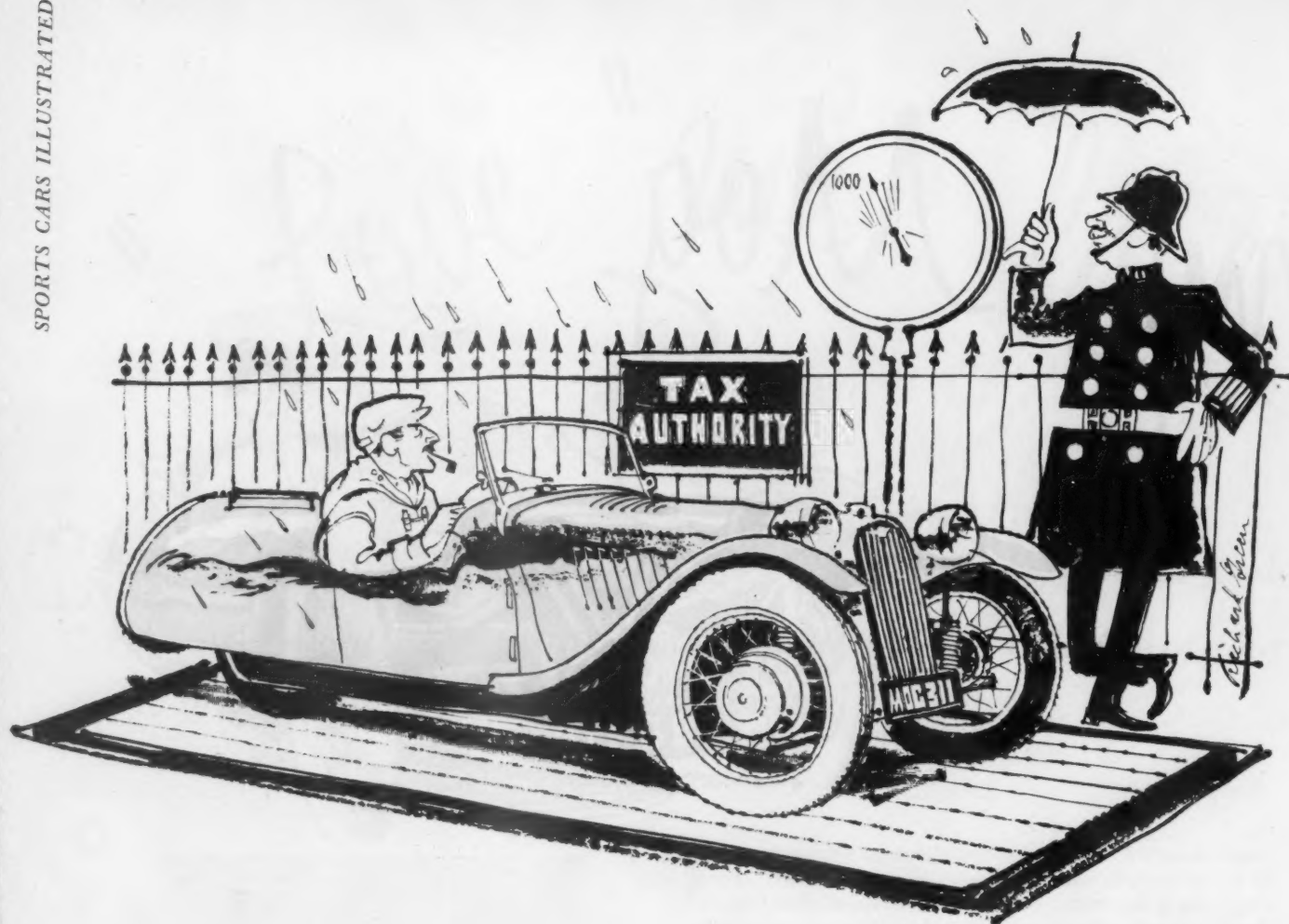
Morgans owed their legendary liveliness to two things — a lot of power and the least possible weight. They are powerful, relative to displacement, because Harry Morgan, who never built an engine of his own, knew how to go shopping for engines. Twenty-seven years before Chrysler opened the eyes of their larger clientele to the benefits of fully inclined valves and hemispherical combustion chambers, these top end features were regular practise on the big V-twin J.A.P. and Blackburne plants installed by H.F.S. in his hairier lines. The Matchless engines fitted later had them too. If they *hadn't* breathed freely, the 1.1-litre J.A.P.

Passengers sitting in the rear of this "Mog" may not have had much leg room, but at least it beat walking.



Photos Courtesy the LIGHT CAR

JUNE '56

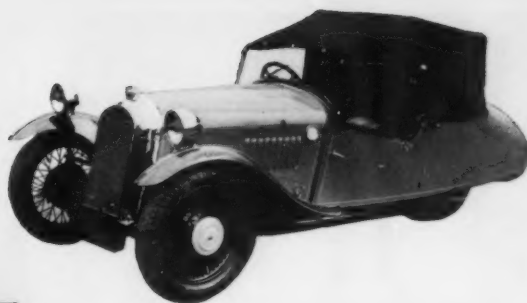


The classic twin-cylinder tricar was replaced in 1948 by the more sedate four cylinder types. This Ford Anglia engine was slightly hopped up by minor internal modifications.

twins of the early 30s could never have attained their genuine 40 b.h.p. output, because compression ratios were of the 'six-and-a-decimal order' and the gas available commercially at the time in Britain had about the same octane value as hair tonic.

There were two reasons why Morgans weighed light: one, H.F.S. wanted it that way, and two, the British tax authorities made it worthwhile. To qualify for certain generous fiscal concessions, all three-wheelers – "tricycles" in bureaucrat terminology – had to keep below a ceiling of 896 pounds unladen. Some Morgan models crowded this limit so closely that their owners always chose a dry time of year for presenting their trikes for official weight checks; in humid weather the woodwork in the body absorbed enough moisture to push the car over the tax line.

Simplicity was the nub of the Malvern design prescription. The chassis of the two-cylinder models had three tubular longitudinals, the middle one acting both as a backbone and a torque tube. The other two, equally spaced on either side, were at a lower level and supported the body. Up front, at hub plane, they met and joined a pair of transverse tubes, placed one above the other. The outer ends of these cross-members formed hitching posts for the unusual Morgan system of independent front suspension, wherein the stub axles were attached to bronze sleeves which slid up and down on vertical guide pillars. There



LEFT: Mog's stopping ability was no doubt due in part to the tiny brake drums. Third wheel at rear isn't visible here. Fourth wheel is spare hung in Continental fashion at the back.

were two coil springs per wheel assembly, one above and one below the axle. This suspension arrangement, which was originated by Decauville in France in 1899, was first used by H.F.S. on the experimental single-seat trike he built for his personal and solitary transportation in 1909, and from which all subsequent Morgans have directly descended. (It is still a feature of the four-wheel cars.)

The twin-cylinder engine, whether of Anzani, M.A.G., J.A.P., Blackburne or Matchless *marque*, was hung out ahead of the frontal rectangle of chassis tubes. A minority of Morgans, the tamer types, had a hood like a coal scuttle that enclosed the engine, but the more numerous and potent Grand Prix, Aero and Super Sports jobs disdained such prudery and exposed proudly jutting cylinders to the common gaze. There were both air- and water-cooled variants, the radiator and heater tank, were appropriate, being mounted *behind* the engine.

Transmission on the oldtime Morgans, reading from front to back, comprised a cone clutch with leather friction facing, an enclosed cardan shaft, a bevel box, a short counter-shaft with a sprocket on each end, and two motor-cycle type roller chains to the back wheel. The latter was carried on a pivoted fork and sprung on quarter-elliptic springs. The driving sprockets, of course, were of different sizes, so one chain gave one ratio and the other another. Shifts were effected through a long outside lever actuating exposed dogs. There was no reverse.

This layout originated on the guinea pig Person's Car in 1909, and, as Harry Morgan disliked being rushed, it remained in steady service for over twenty years. In 1931 he scrapped one of the chains and introduced a proper gearbox with three forward speeds and a reverse. About a year later the rather brusque cone clutch was replaced by one of single dry plate type.

These then were the bare bones of the isosceles automobile which made the initials H.F.S. a symbol of greatness in the eyes of a trike-loving multitude probably numbering 100,000, counting in the disciples who bought second-



Winner of countless silver cups, the trikes soon became a legend that was to remain a part of the Morgan heritage.

(Continued on page 57)

engine swap:

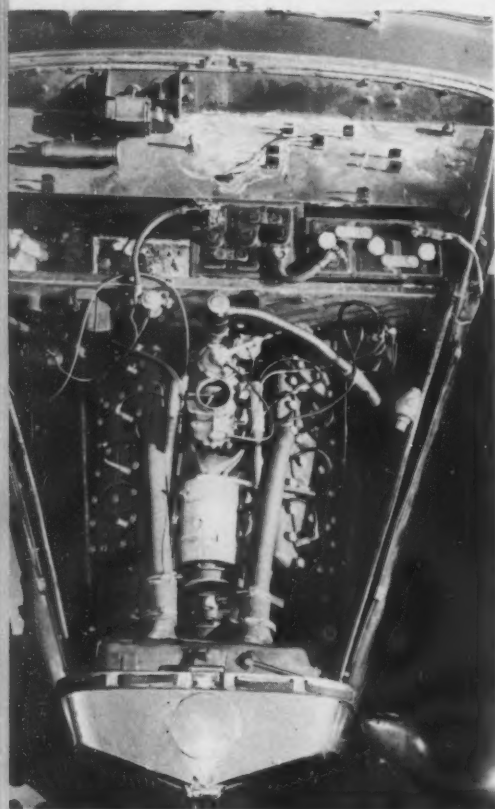
By AL PROKOP



Triumph—Ford

*The engine in the Triumph 1800
is a boy doing a man's job.*

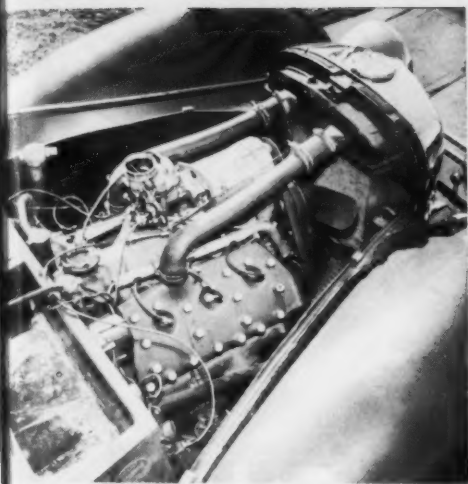
A V8 will add those big muscles



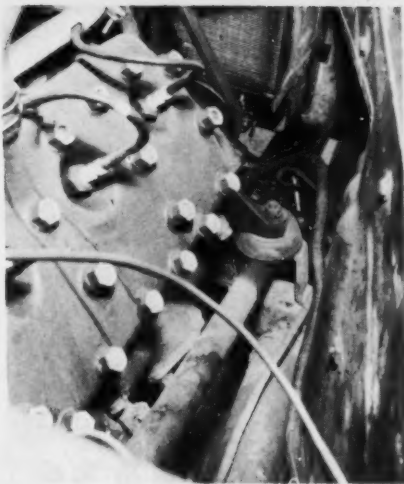
WHEN Leonard Prokine finally realized that the only car his classic Triumph could beat away from a light was a parked '38 Chevy, he became somewhat disconcerted. As a member of the Sports Car Club of America he felt obliged to uphold the reputation of the club. The Triumph was letting down the club, the admirers, and the owner. The engine was tired and, despite its noise, moved the car feebly. The time had come for a change. But what kind of change?

What does an owner, who is proud of his automobile and yet discontented with its performance, do? Dispose of the car and buy another? Perhaps, but not likely! If he has a great fondness for his car as Prokine did, he will embrace the good features, and take steps to improve the imperfections. What other sports car, he reasoned, could be purchased in the same price class and still be as distinctive? And what other sports car had two auxiliary seats in the trunk compartment and could accommodate five passengers if the need

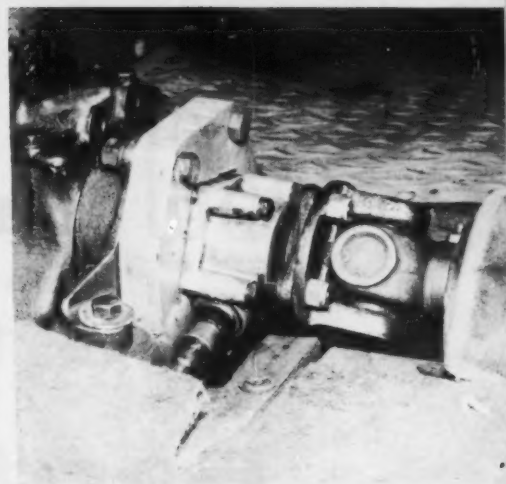
Overhead view, with hood removed shows neatness and balance of installation. Hood length is deceiving, latter third being taken up by battery carrier.



Ford V8 uses almost every available inch under hood. Dual water outlets necessitated adapting Triumph radiator. Generator remained twelve volts.



Steering column runs through engine mount. Clearance between post and support is less than 1/8 inch. Despite narrow clearances, no vibration is felt.



From passenger compartment, view shows machined aluminum plate which retains rear bearing of transmission and holds speedometer drive and housing.

arose? Quite obviously, none. The only alternative left for Prokine was to re-power the Triumph. The car could stay, but the engine had to go.

Originally, the Triumph was built for a four cylinder engine of approximately 1800 cc displacement. It is a long stroke, small bore engine delivering about sixty-two horsepower at 4400 rpm. The weight of the car is about twenty-five hundred pounds. In terms of power-to-weight, this means that the Triumph 1800 engine hauls about forty pounds for every single horsepower it delivers. This isn't satisfactory for a light truck, much less for a sports car, and so a very justifiable reason for modification. Yet, just modifying this engine wasn't really the answer. In the first place, for the amount of power gained, the cost would be

overwhelming. And when all was done, the Triumph would still have four little pistons straining beneath the hood.

These, then, are the considerations with which Prokine had to concern himself. A slightly larger engine would be the answer to the Triumph's troubles. But what engine would do the trick? And how much would it cost? The best thing to do would be to consult someone who had successfully done conversions, and who was familiar with the problems involved. And so Prokine went to Fred Hodgson of Forest Hills.

After some lengthy discussions, they decided on an American engine with a stock horsepower of about one hundred, but not too large in size. The Triumph engine compartment was

limited in space and they had no intention of redesigning the body in order to squeeze in a new power plant. There were two reasons for the selection of an American engine. For one, Prokine wanted a car which would take him around the country to the various competitive meets. Should the engine develop difficulty en route, he could casually drop into any garage and be sure of service. If parts were needed they would be immediately available at American prices.

After carefully measuring the engine compartment, and various engines, Hodgson decided a 1940 Ford V8, putting out 90 bhp, would fit snugly but comfortably. However, while the size and power of this engine would be suitable, the engine's characteristics

(Continued on page 60)

Underview of chassis shows the right front engine mount straddling steering column. Note old mount was burned off, given quarter turn and rewelded.

Ford exhaust manifold flange opened directly on steering column. It had to be closed off and a new flange inserted further back on manifold to clear post.

Pedal linkage rearranged to fit Ford clutch. Shaft was set in right side of housing, eliminating extra linkage to activate clutch bearing from the left side.

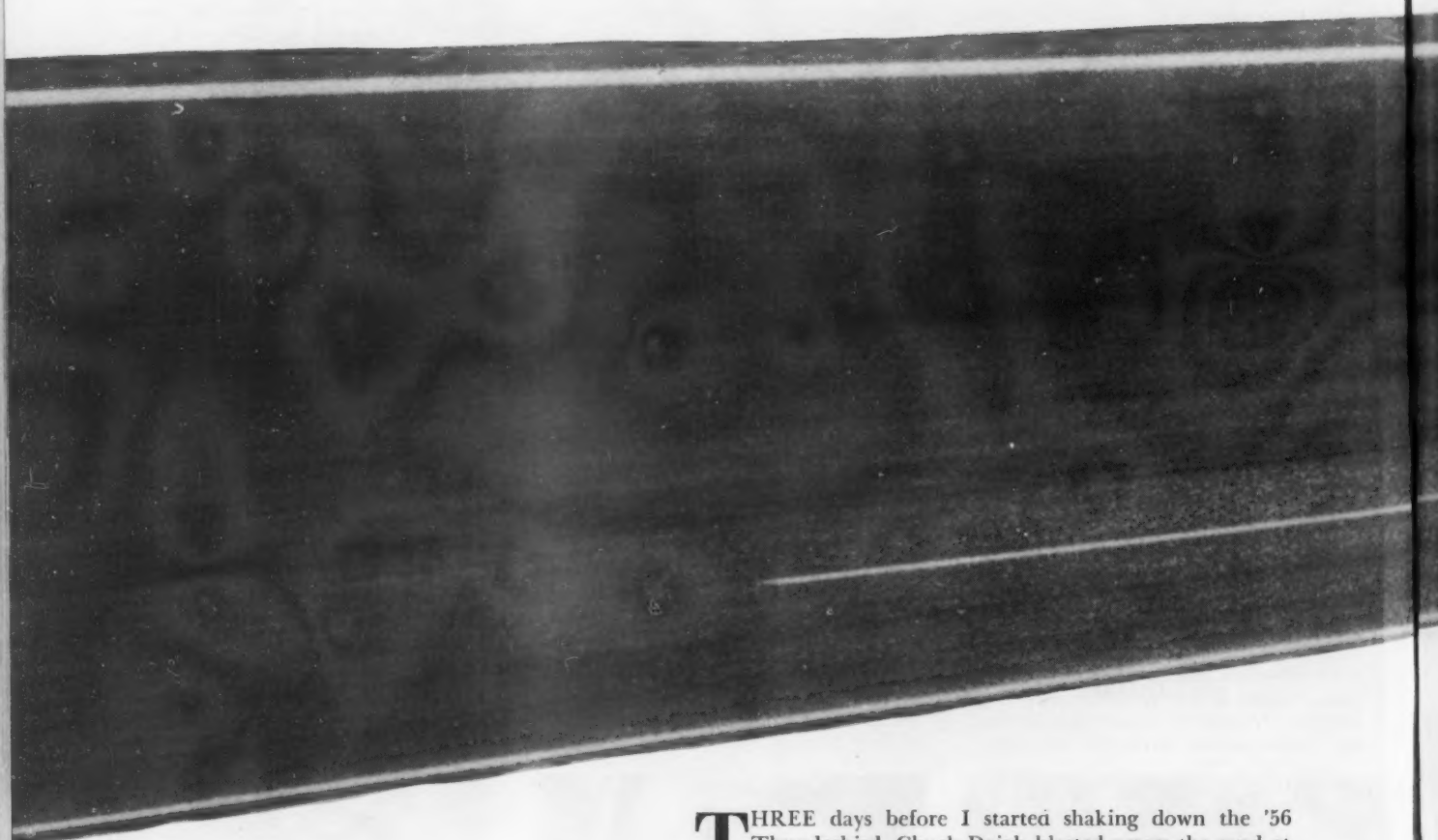


JUNE '56

SCI tests

the 1956

Ford Thunderbird



At kingman Arizona proving ground T-Bird laps test course with test driver J. B. Corbin behind wheel.

THREE days before I started shaking down the '56 Thunderbird, Chuck Daigh blasted across the sand at Daytona in a similar but souped car and covered the standing mile in 39.07 seconds, an average of over 92 mph for the distance. A few days later I clocked a stock T-Bird on Ford's Arizona proving ground at a sizzling 119 mph.

On the surface these figures seem to indicate that the T-Bird has a solid potential as a competition sports car, and that Ford has started to tap it. But it only looks that way when you take the figures out of the overall T-Bird context.

The Bird has plenty of brute strength but it is no sports car. Even though it corners very well this year, its chassis, steering and brakes still make it best suited to turnpikes and drag strips. Nevertheless, Bird sales in '55 wrote one of the big success stories of the year; 16,155 of them were sold, a new record for sports-type cars in the U. S. and far more than anyone at Ford expected. For '56, plant facilities have

*"As a touring car
and a sports car...
...an improvement
on its predecessor."*



been expanded to fill an expected 20,000 orders. This estimate, too, may be conservative.

Don't assume, though, that the screaming success of a not-quite-sports car means that the U. S. public is too dull and insensitive to know what it's buying. This is not true. Because if the Bird is something less than a sports car, it is something more, too. While it has only some of the handling and performance characteristics of full-fledged high-performance cars, it also has the comfort, convenience and luxury of good Detroit touring iron — qualities that most American drivers find it hard to do without.

As both a touring car and a sports car the '56 Bird is an improvement on its predecessor. But for as long as the car's sports side is going to be molded to fit the requirements of its touring side, there's bound to be a pretty tight limit on how good it can get from the point of view of the *pur sang* enthusiast. Last year it seemed possible that the Bird was the first of a series of transition cars that would lead to a mature sports machine. But this year all the indications are that the Bird is going to stay split down the middle and as schizoid as Dr. Jekyll.

You can't drive the car for 10 minutes without becoming aware of the contradictions and compromises that the car's double personality makes necessary. When you punch the throttle, for example, there's a pronounced lag before the car moves forward. This is the result of the use of a simple Hotchkiss drive — part of the Bird's touring car heritage — in combination with rear springs which are not at all firm enough to give good resistance to rear axle torque. Last year's car had 48-inch five-leaf half-elliptic rear springs and a ride that was definitely firmer than the Detroit standard. The new model has four-leaf springs at the rear and they are now 56 inches long. Now the car has as smooth and gentle a ride as most Detroit touring cars, and its roadability has not been adversely affected, but there is the lag. Furthermore, if you rock the steering wheel while you're going down a straight stretch, the car wallows heavily back and forth on its springs — the opposite of an all-of-a-piece feel. The sprung part of the car leads a life of its own, with little regard for the unsprung part.

The Bird's steering is another case in point. Last year the car, when equipped with power steering was entirely —

*“...a not-quite-sports car
that is doing a very
real missionary job...”*

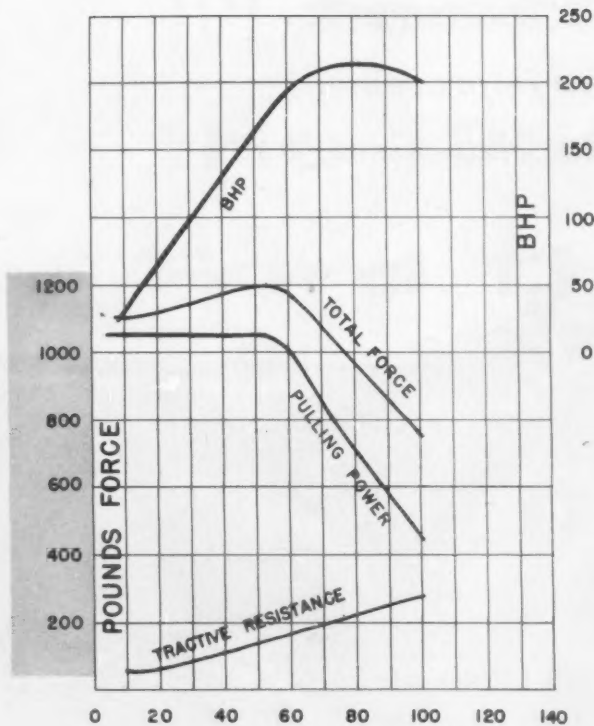
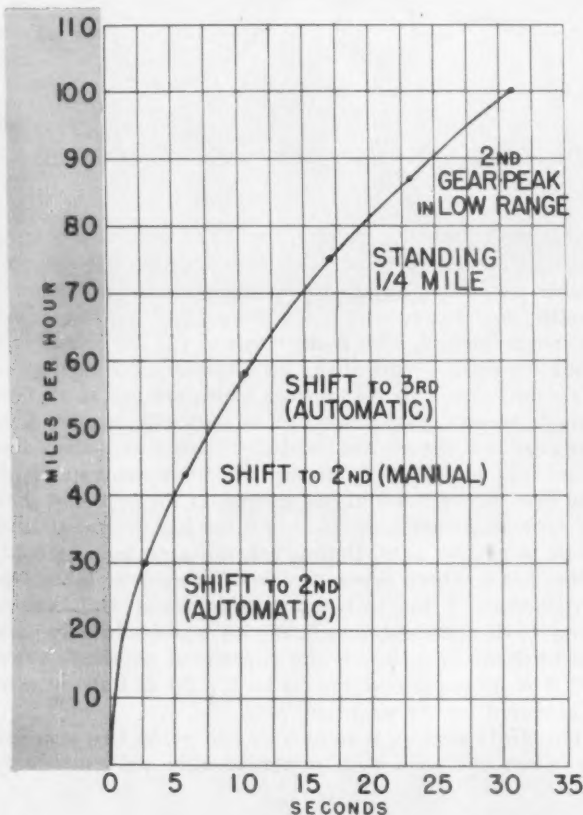


Chart shows results obtained with a gravity accelerometer (Perfometer). Bottom scale is calibrated in miles per hour.



almost lethally — devoid of feel. This year the feel is pretty acceptable, but the steering is far too slow. In '55 it was none too quick at 3.5 turns from lock to lock. Now it's really slow at 4.75 turns. Try to negotiate a complicated maneuver with both hands on the wheel and you get as tied up as if you were in a straightjacket. When the wheel has to spin through hundreds of degrees to aim the car where you want it to go, the only way you can operate is with one hand, and this is steering the hard way. It may not matter much when you're just parking the car or tooling conservatively along mountain roads, but when you become concerned with skids and with vital, sudden changes of direction — as in racing — you need more than the Bird gives you.

Even so, the T-Bird corners remarkably well. When I weighed it I found that with the fuel tank three-quarters full the weight on the front wheels was within five pounds of the weight at the rear. This good balance, plus a low center of gravity and a close tread-to-wheelbase ratio, helps the Bird achieve really excellent road adhesion. For test purposes I use a tight corner that has held some of the fine European sports-touring cars to a ragged 55 mph. But the '56 Bird, in the hands of competition driver Russ Kelly, who ran the test with me, snarled through the turn a good 10 mph faster.

Equally good is the Bird's acceleration. The car has a healthy enough power-to-weight ratio for it to hold its own with many of the world's really fast machines. But you should not attempt full-throttle starts with this car. What you get instead of a quick acceleration time is violent wheelspin.





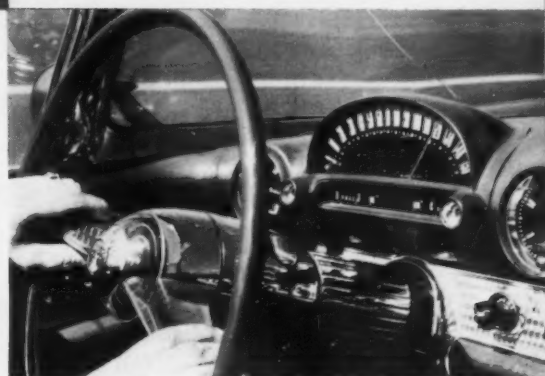
The power plant with the engine dressup kit. Underhood bright work costs an extra \$21.50. This stock Fordomatic engine is rated at 225 hp.

BELOW: Indicating 120 mph on the Bird's clock. Car stayed on high edge of banked course without hands on wheel at this speed. Note light hand control here.

A good part of the reason for this behavior is the thrustier horsepower of this year's T-Birds. In '55 all the models had 292 cubic inch engines with 193 advertised horsepower for the stick shift and OD versions and 198 for the car with Fordomatic. Now only the manual shift job has the 292 engine and it's rated at 202 bhp. The Fordomatic and OD cars have engines bored and stroked to 312 cubic inches and are rated at 225 and 215 respectively. My Fordomatic test car did not have the new power kit, which is now available to the public on a very limited basis. It also did not have the competition camshaft and the pair of four-throat carbs that were in Chuck Daigh's car. Without these extras the top speed was not sensational but higher than last year's.

On my own test course, with just a 1.5 mile approach to the timing traps, I was only able to clock an actual 108.7 mph. At the proving ground, under ideal conditions and with a five-mile approach, I got a one-way run of 119.4 mph. Incidentally, at this actual speed the speedometer was

(Continued on page 62)



Spare must be tilted back in order to refuel. Tilt mechanism, however, is solid and simple to operate.



This view shows seating position of T-Bird. Adjustable seat and steering wheel allow for various positions of comfort.



T-Bird holds well on standard test curve, but left hairy skid marks. According to author, "It didn't have the glued feel but it stayed stuck and got through the turn faster than some pretty good foreign stuff."

PERFORMANCE

Fordomatic model, 225 bhp

ACCELERATION:

From zero to	Drive range	Low range
30 mph	3.3 secs.	3.2 secs.
40	5.4	4.9
50	8.5	8.0
60	11.7	11.5
70	14.9	14.7
80	20.2	19.8
90	25.2	24.9
100	31.8	31.0
Standing ¼ mile	17.3	17.1
Standing mile	45.4 (average 79.2 mph)	

SHIFT POINTS:

First (automatic)	28 mph (actual)
First (manual)	43 mph (actual)
Second (automatic)	58 mph (actual)

TOP SPEED: (1.5-mile approach to ¼-mile timing trap)

Two-way average	106.4 mph
Fastest one-way run	108.7 mph
With five-mile run	119.4 mph

SPEEDOMETER CORRECTION:

Indicated	Actual
30 mph	27 mph
40	36
50	44
60	53
70	62.5
80	72
90	82
100	91

Three-quarter front view shows new T-Bird to be basically unchanged in body design. Major alterations were accomplished in the steering, engine, and rear springing.



Underchassis shows X braced frame and simple Hotchkiss drive. Front suspension is standard ball joint used on all Fords.

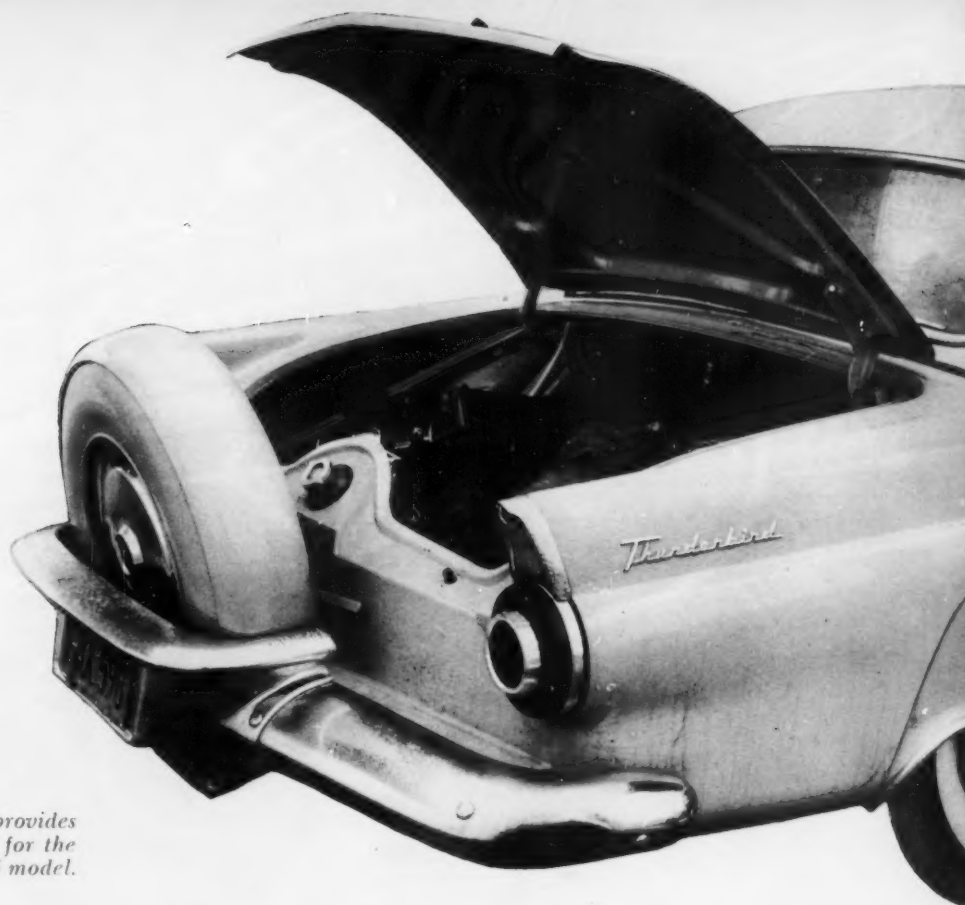
RATING FACTORS:

	Std. trans.	Overdrive	Fordomatic
Bhp per cu. in.	.69	.69	.72
Bhp per sq. in. piston area	2.29	2.37	2.48
Pounds per bhp — test car	—	—	15.8
Piston speed @ 60 mph	1545 fpm	1140 fpm	1430 fpm
Piston speed @ max. bhp	2530 fpm	2640 fpm	2640 fpm
Brake lining area per ton (test car)	—	—	101 sq. ins.

FUEL CONSUMPTION:

Very hard driving	11.3 mpg
Average driving under 60 mph	12.7 mpg

***T-Bird . . .
an esoteric
gospel for
the unsaved . . .***



Continental spare arrangement provides more luggage space in trunk area for the touring minded motorist, than did '55 model.

SPECIFICATIONS

POWER UNIT:

Type	V8		
Valve arrangement	In-line, pushrod operated		
Idle speed	475 - 500 rpm		
	Std. Trans.	Overdrive	Fordomatic
Maximum bhp	202 @ 4600	215 @ 4600	225 @ 4600
Maximum torque, lb.-ft.	289 @ 2600	317 @ 2600	324 @ 2600
Piston displacement	292 cu. in.	312 cu. in.	312 cu. in.
Bore x stroke	3.75 x 3.30 in.	3.80 x 3.44 in.	3.80 x 3.44 in.
Stroke Bore ratio	.88 to 1	.91 to 1	.91 to 1
Compression ratio	8.4 to 1	8.4 to 1	9.0 to 1

DRIVE TRAIN:

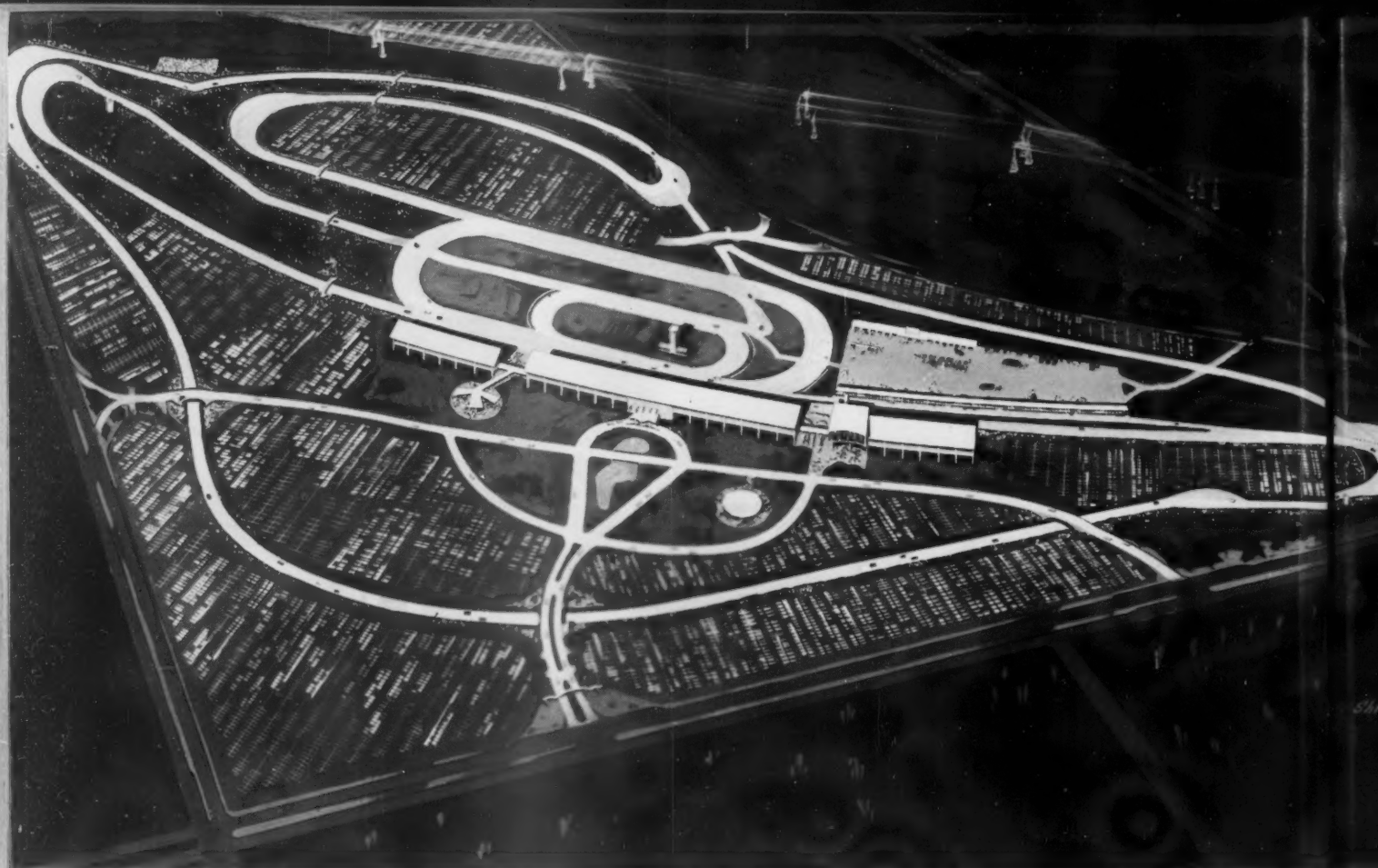
Transmission ratios	1st - 2.33	1st - 2.33
	2nd - 1.48	2nd - 1.48
	3rd - 1.00	3rd - 1.00
		OD - 0.70
Final drive ratio	3.73	3.92

CHASSIS:

Suspension, front	Unequal length wishbones, coil springs, ball-joints.
Suspension, rear	Solid axle, torque taken through semi-elliptic springs.
Shock absorbers	Houdaille direct tubular, F & R; 1 in. piston diameter.
Steering type	Worm & two-tooth roller.
Steering wheel turns	4.75 from lock to lock.
Steering turning diameter	36 ft.
Brake type	Hydraulic duo-servo, cast iron drums, 11-in. diam.
Brake lining area	175.5 sq. ins.
Wheel studs	5½-in. studs, 4½" circle diam.
Tire size	6.70 x 15
Rim width (outside)	6.5 ins.
Wheelbase	102 ins.
Tread	56 ins., F & R.

GENERAL:

Length	175 ins.
Width	70 ins.
Height	52.5 ins.
Weight, test car	3550 lbs.
Weight distribution, F/R	50/50



BY mid-summer of this year, the United States may be able to command a respect in international motor racing that it hasn't enjoyed in nearly a quarter century. At least, that's the reaction of racing experts to the announcement that United States Automotive Testing, Inc. has started construction on a \$12,000,000 racing plant in Southern California.

The 470-acre site, officially known as the Los Angeles International Motor Raceway, is located at the base of the rugged Sierra Madre Mountains near Ontario, California, just 32 miles from downtown Los Angeles. It will contain complete facilities for every type of big time automotive event.

The story of the Raceway began in a wild, imaginative dream, the dream of two men in love with racing. These men were Al Torres, the race starter whose colorful showmanship has already made him something of a living legend, and Rudy Cleye, a Swiss restaurateur whose European racing background and rapid white Mercedes have made him one of the hottest items currently in sports car competition. Unlike most dreamers, this pair did something about it.

What they did was simple, direct and productive. Realizing the breath-taking amount of money necessary to transform dream into fact, they approached Kermit Pollack, a general partner in Investment Associates, Ltd. and one of the leading young business executives in the United States today. The idea struck a responsive chord in Pollack, who specialized in automotive finance at an earlier point in his career, and an organization was set up with Pollack as president, Torres as Racing Director, Cleye as Public Relations Director and Jeff Cooper, a young engineer long associated with the automotive world, as liaison man between the corporation and Quinton Engineers, Ltd., designers of the Raceway.

The particular site was chosen because of rapid accessibility by freeway and major highways. A nearby railroad spur and air terminal will make the shipping of cars easily possible from all parts of the world.

Original plans called for an initial investment of \$1,000,000 on a site in California's San Fernando Valley. But as the full potential of the venture hit home, it became apparent that the available 280-acre plot was too small, as was the original budget. Another location was sought and the initial ante was boosted to \$3,000,000, with another \$9,000,000 to be invested over a four year period.

Sports Cars Illustrated representatives got their first hint of the impending Raceway some eight months ago and hundreds of hours of meticulous planning and investigation had already gone into it. Nothing was left to chance. The decision to place the Raceway in Southern California, as an example, came after research showed this area had become the Mecca of automobile racing in recent years and contained the country's heaviest concentration of fans, drivers and competition machines.

Planners stress that this isn't merely another racing circuit, but a carefully engineered combination of seven distinct courses, including (1) 1.7, 4.5 and 5.5-mile road circuits that will accommodate Grand Prix racers, sports cars, stock cars and motorcycles; (2) one mile and one-half mile ovals; (3) a quarter-mile acceleration strip; and (4) a three-mile testing circuit running around the perimeter.

Engineering specifications list a 6100 foot front straight and a 3000 foot back straight as part of the asphalt paved road circuits. Actually, however, the front straight is a gentle bend, designed so spectators in the grandstand can see more than the back of their neighbor's head as they strain to view the cars whip out of the final turn and power past the pits. Experts estimate that speeds up to 180 mph

grand prix goes west



can be obtained on the long straightaway and that average lap speeds will be in the vicinity of 90 mph, some 20 mph faster than possible on courses now used throughout the West.

Beyond the shoulders on both sides of the roads, which range from 35 to 100 feet wide, will be four foot strips of grass, adjoined by multi-flora rose bushes four feet high and eight feet thick. Tests have shown that these bushes will absorb the impact of a car leaving the road at high speeds with a minimum of panel bending. Behind the bushes will be a four foot, triple strength chain link fence.

Escape roads were deliberately ignored when drivers and design experts pointed out that the error of over enthusiasm in cornering frequently goes unappreciated until the G's take over, well after the car is into the turn. Instead, the outside of the turns will have a wide "slide area," giving wandering drivers ample time to reduce speed and regain control.

A permanent shop and garage area are scheduled and will include parts and accessory sales, power equipment and complete shop facilities. Clean starts will be assured through a system of electric trip wires on each starting grid and an overhead light will flash off the seconds remaining to eager, impatient drivers. A system of colored lights will replace time-honored flagmen and will be controlled from a tower atop the press building. Scoring will be done by electronic calculators and lap by lap results will be flashed to the public on a multi-faced tote board.

Those close to the international automotive picture realize that a majority of all cars manufactured in Europe must be exported and know that, for the most part, factories support racing teams almost entirely for the prestige and publicity it brings to their products. In the past, little has been done on the U. S. front — potentially one of their richest markets — since the country's top speed attraction would require building an expensive and highly specialized machine. With facilities capable of handling an event of major proportions featuring cars already built or in production, the lure should prove nearly irresistible.

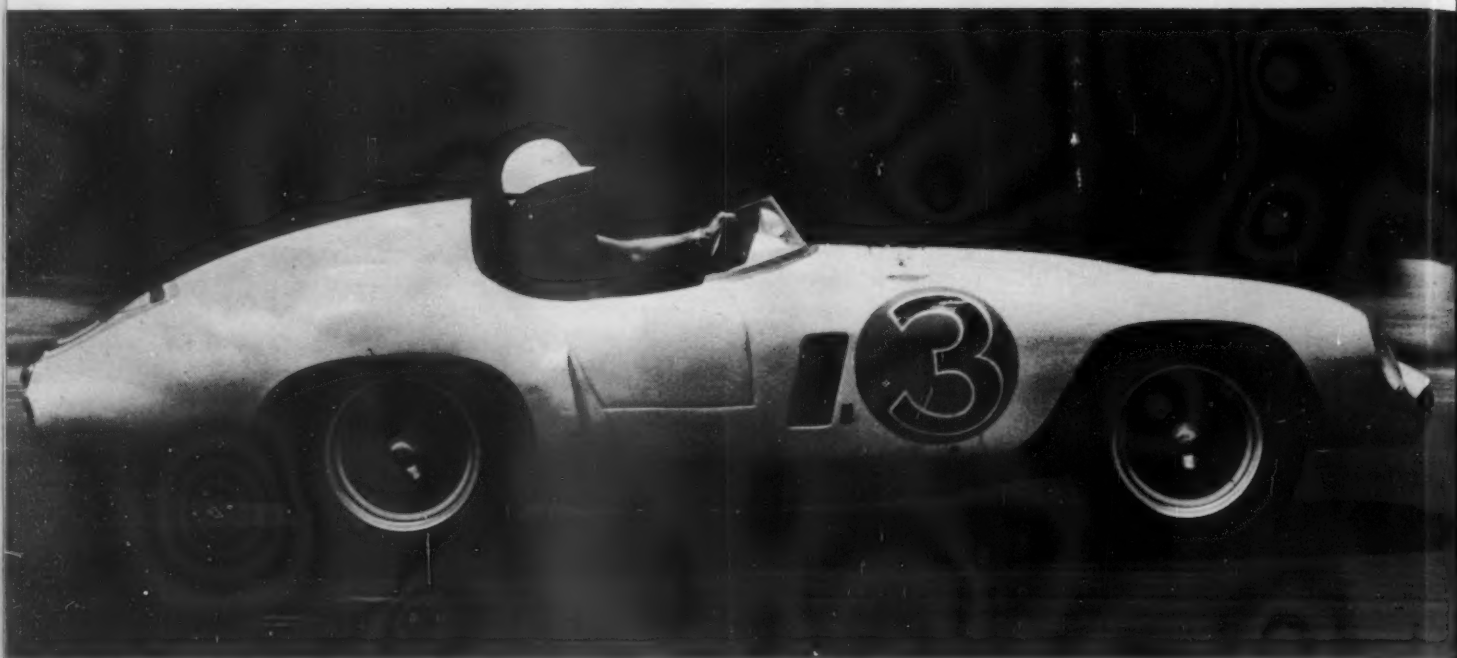
The one American event most likely to feel the impact of this program is the Indianapolis classic. Officials have asserted that the Raceway "will not compete with Indianapolis; they are a tradition." But it's generally conceded that only courtesy and respect for tradition have kept Indianapolis on the International Calendar. If the public education program succeeds in convincing people of the true significance of international racing, the center of U. S. competition stands a good chance of shifting from Indianapolis to Los Angeles.

United States Automotive Testing is fully aware of the fiasco at Roosevelt Raceway the last time motor racing on an international level tried to take its place in this country. They feel that a combination of better timing and superior facilities guarantees their success. The validity of this assumption may get its first severe tests before the year is out. #

This is what the completed \$12,000,000 raceway will look like sometime at the decade's end. Rapid accessibility by freeway and major highways make proposed raceway ideally situated.

Racing director Al Torres and Public Relations Director Rudy Cleye. Torres is probably the best known official in Sports Cars today. Cleye's background includes driving Maserati, BMW, Alfa, and others during the thirties.





Phil Hill barrels a new 3 liter Ferrari Monza as he succeeds in capturing two overall firsts and two modified class D wins in the 52 mile Tea Party (sic) Trophy, and the 104 mile Beverly Trophy at Beverly, Mass. He averaged better than 80 mph.

the seven hour *Stormer*

*The 750 Monza, a busy four with an average
life expectancy of just seven hours,
is still king of the short course.*

By KARL LUDVIGSEN

CLASSIC tradition in sports car design has always insisted that the pure racing car must come first. From that the sports car can be developed, and, eventually, the touring car. Before the war Bugatti and Alfa Romeo stood as very good examples of this technique, and Tony Lago fol-

lowed generally similar lines with his French Talbots in more recent years. Italy has always remained the homeland of the purest in automotive design, however, and only there could such establishments as O.S.C.A. and Ferrari flourish.

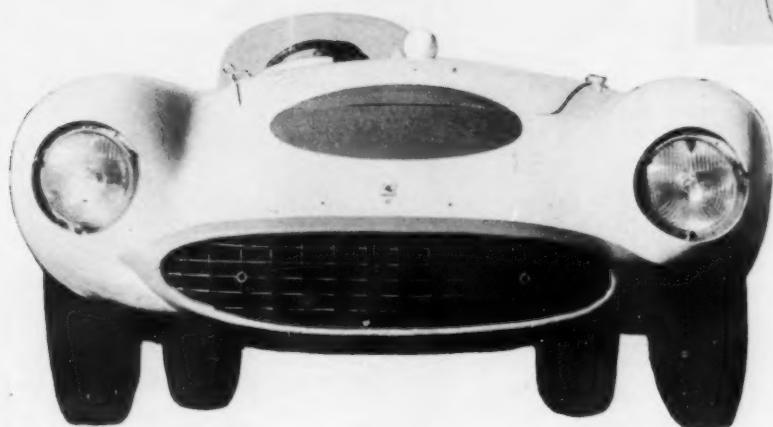
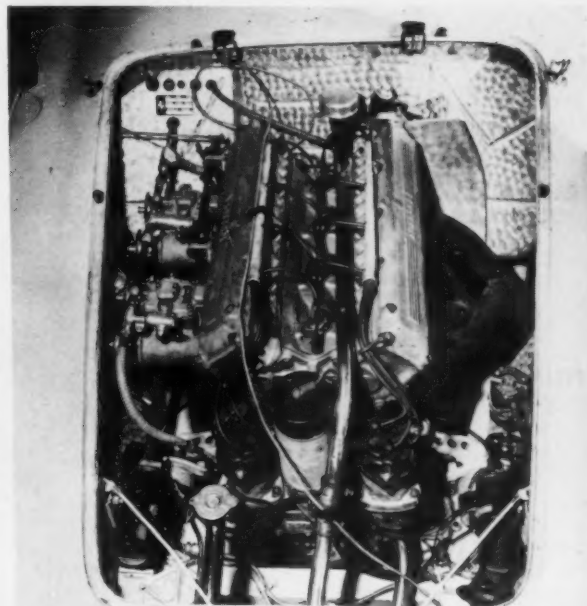
Enzo Ferrari in particular has

carried on the pure design tradition, and even his early postwar racing machines were Grand Prix or sports at the twist of a fender or headlight. The recent strong emphasis on sports cars has drawn the likeness even closer, and Ferrari sports and G. P. developments seem to proceed at a parallel and



Unfinished cockpit of a Monza in assembly reveals polished light alloy interior. Early body designs were executed by Autodromo, Vignale and Farina, but later models owed their form and shape to Dino Ferrari, son of famous Enzo.

Designated the Type 105 by Ferrari, the four cylinder power plant employs such racing engine features as twin overhead camshafts, twin ignition, hemispherical combustion chambers, and sodium filled valve stems.



Monza front shows a wide symmetrical grin as if anticipating victories to come.

equal pace. No better illustration could be chosen than the famed Monza model, which through 1955 became the backbone of the Ferrari team and the all-purpose workhouse of many private owners. For do-it-yourself racing on an international level, the Monza has become THE car. Performance-wise it is overshadowed by its more spectacular big brothers, the 4.4 and 4.9, but its handiness and versatility have made it the King of the Short Courses and a tough contender in bigger arenas.

It really all started during the 1950 Formula II season, when John Heath

ran a very impressive team of HWM cars on the European continent. Particularly in the hands of Stirling Moss, these deceptive-looking green cars pressed the official team of two-liter Ferrari V-12's, and did it with Alta engines of only four cylinders. Ferrari could see that this type of engine had torque and weight characteristics well suited to certain types of tracks, and he put his "new boy" Aurelio Lampredi to work on a new Formula II engine. In 100 days the first four-barrel from Ferrari had been designed and built, and it saw action in the Fall of 1951.

That same Fall found a 2.6 litre version of the four in a G.P. car at Monza, and engines of that size were campaigned in Formule Libre races as preparation for the 1954 formula change. From these it was but a short step to a three liter version, and such an experimental sports car made a promising but troublesome appearance at Senigallia in 1953. Ascari wrecked another one at Monza in that year, and in January of 1954 Bonomi and Menditeguy took the Senigallia car to Buenos Aires and there held off one of the regular "twelves" until the torque of the four shattered the final

ENGINE

Cylinders.....	4, in line	
Bore and stroke.....	4.05 in x 3.55 in (103 mm x 90 mm)	
Capacity.....	182 cu in (2999 cc)	
Piston area.....	51.2 sq ins.	
Compression ratio.....	9.2 to 1	
Output.....	250 bhp @ 6000 rpm	
Valves	Intake	Exhaust
Open.....	50° BTC	78° BBC
Close.....	80° ABC	48° AT C
Clearance.....	.008	.010

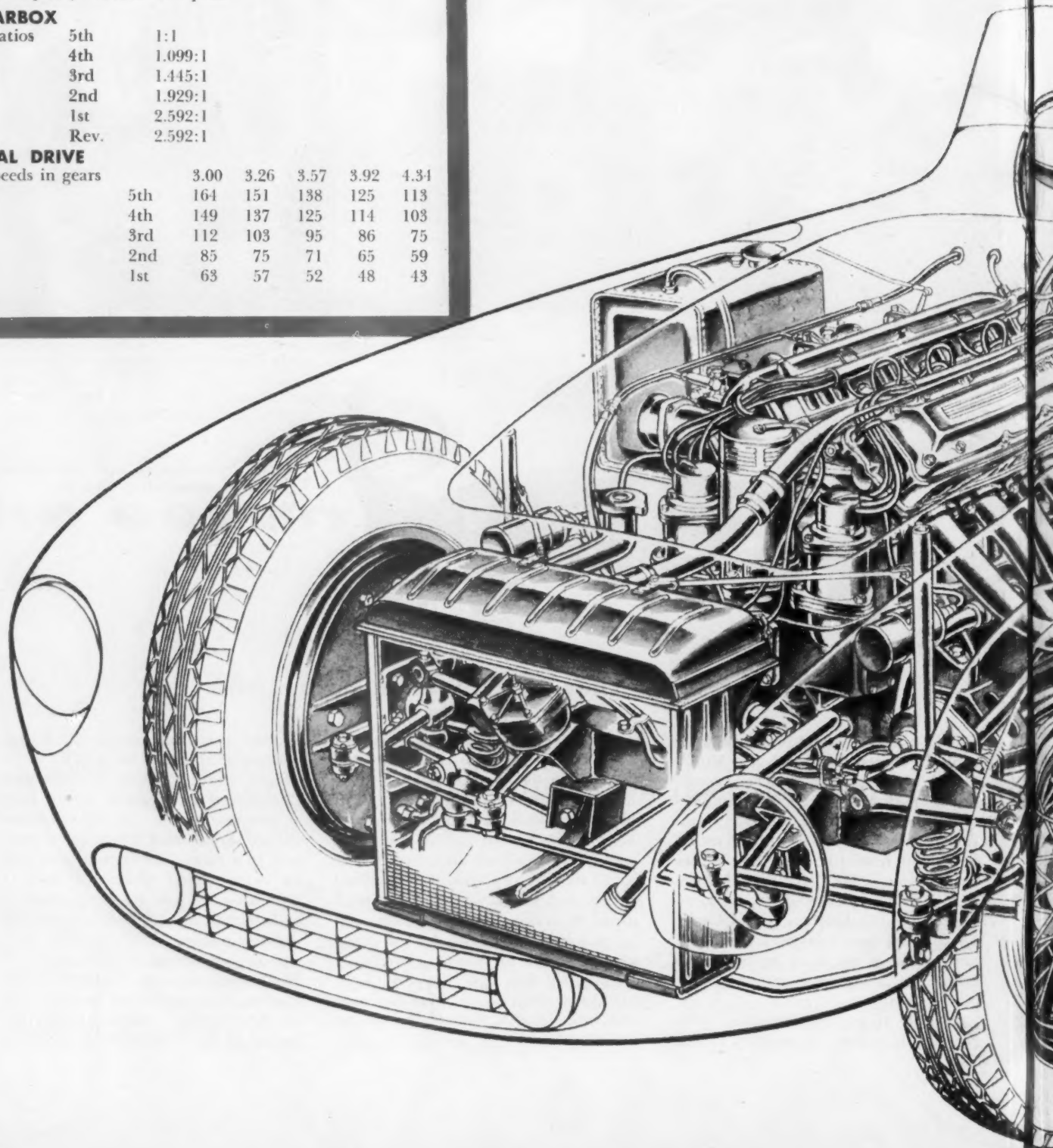
Clutch	10" dia. dry double plate
Carburetors.....	2 Weber 58/DCOA/3
Oil capacity.....	33.8 pints

GEARBOX

Ratios	5th	1:1
	4th	1.099:1
	3rd	1.445:1
	2nd	1.929:1
	1st	2.592:1
	Rev.	2.592:1

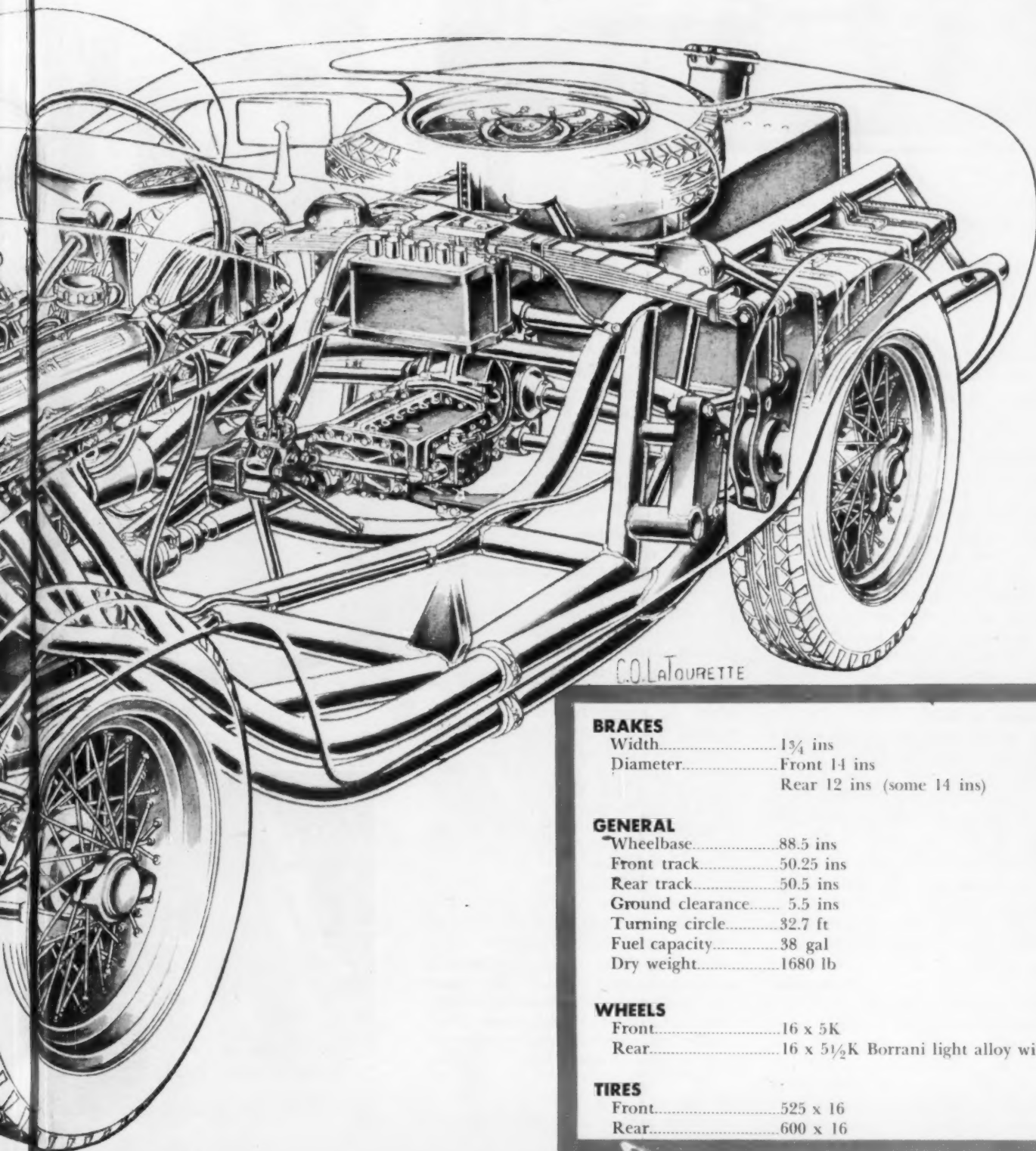
FINAL DRIVE

Speeds in gears	3.00	3.26	3.57	3.92	4.34
5th	164	151	138	125	113
4th	149	137	125	114	103
3rd	112	103	95	86	75
2nd	85	75	71	65	59
1st	63	57	52	48	43



The 750 Monza —

*“a car for do-it-yourself racing
on an International level.”*



BRAKES

Width.....	1¾ ins
Diameter.....	Front 14 ins
	Rear 12 ins (some 14 ins)

GENERAL

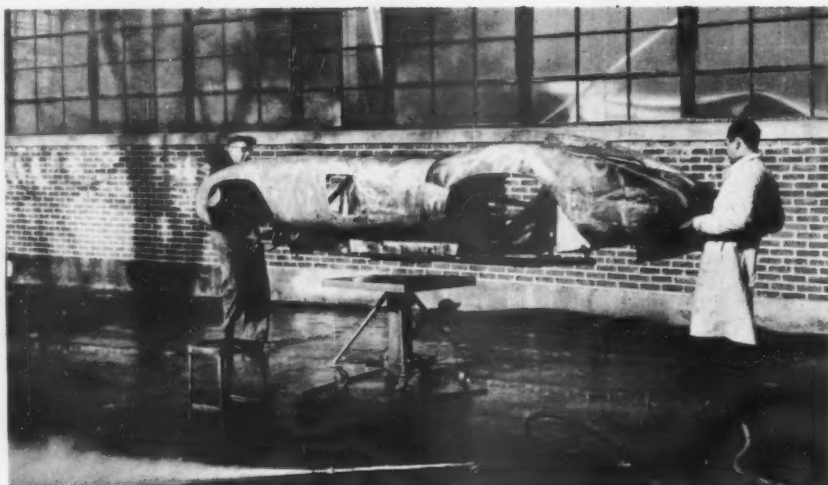
Wheelbase.....	88.5 ins
Front track.....	50.25 ins
Rear track.....	50.5 ins
Ground clearance.....	5.5 ins
Turning circle.....	32.7 ft
Fuel capacity.....	38 gal
Dry weight.....	1680 lb

WHEELS

Front.....	16 x 5K
Rear.....	16 x 5½K Borrani light alloy wire

TIRES

Front.....	525 x 16
Rear.....	600 x 16



Two men lift light chassis and body onto steel welding table for further refinements before mounting running gear.

drive after a pit stop. Milan drove a new car to a conservative fifth place.

These early cars were all highly experimental and closely related to the Formula II cars and the then-developing Mondial, and as such received the type number 735. A greatly altered engine appeared in the Ferrari "Squalo" Grand Prix car at the end of the '53 season and this new pattern plus experience with the 735 cars allowed the designers to lay out a new Type 750 sports car. It will of course be anticlimactic to add that its first appearance was at Monza on June 27, 1954, when Hawthorn-Maglioli took first and Gonzales-Trintignant second in the 1000 Kilometer Supercortemaggiore sports car G.P.

The newly christened Monza model went from strength to strength in subsequent months, and in the light of further experience was modified for a limited degree of production in the winter of 1954-55. Virtually all the Monzas now in action embody these

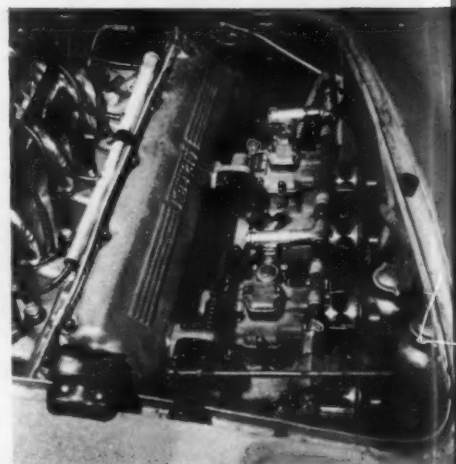
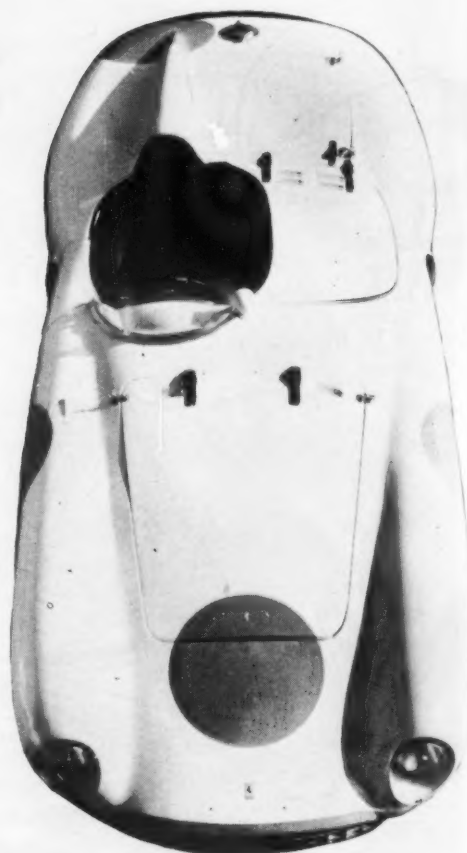
changes, one notable exception being the Sterling Edwards car in this country. It is basically a 1954 machine, and the variations will be dealt with as they come up here.

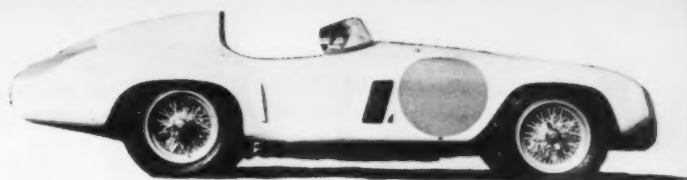
The main line of development toward the Monza series has been via the engine, which is currently designated the Type 105 by Ferrari. Its construction is highly unusual and very clever, and yet embodies many traditional racing engine features. Among the latter are the use of twin overhead camshafts and an integral head and cylinders. This basic Siluminium upper-end casting includes the ports, combustion chambers and water jackets, but not the cylinders themselves, which are separately cast of iron and screwed up into the chambers. Complete and thorough inspection for casting flaws and core sand is thus allowed, and liner thickness and cooling rate can be precisely controlled.

Intake valves are inclined at 45° to the vertical and are at 85° to the ex-

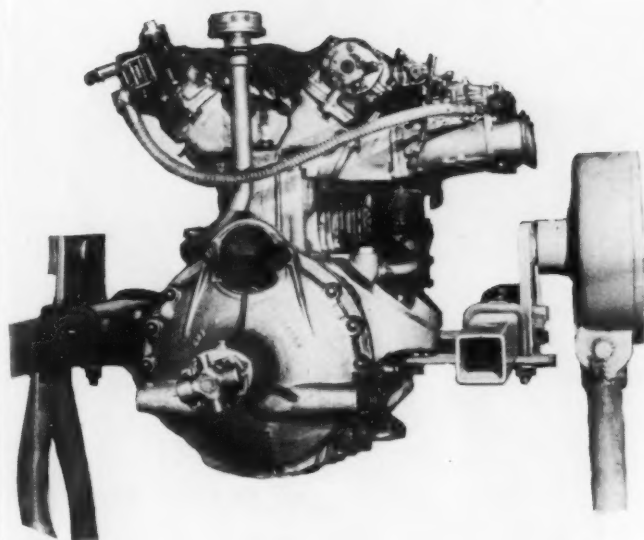
Two 58/DCOA/3 type twin-choke Webers feed the powerful 3 liter engine. These carburetors carry voluminous 44 mm venturii and straight through design which allows ultimate high speeds. Engine is somewhat over carbureted for low speed. But then who goes slow in a Ferrari?

Top view of aerodynamic Monza with metallic tonneau cover in place.



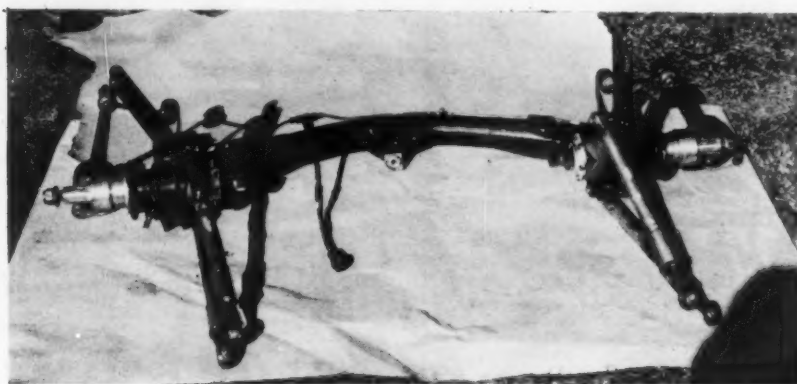


Profile of Ferrari Monza. In terms of power to weight the engine develops approximately one hp for every 6.8 pounds the car carries. Wheels are Borrani light alloy.



Engine sits on test bed prior to installation. Note universal joint which connects to driveshaft just after flywheel and clutch housing. Reason for this is full de Dion rear which carries transmission astern of driver. Opening at top of flywheel cover is for starter.

Frame of de Dion rear-end reveals lateral bars, spring shackles, Houdaille shock absorbers, hydraulic brake line, splined axles and the 2½ inch diameter de Dion tube which connects the hubs.



haust valves, which have sodium-filled stems. Both valves seat in shrunk-in inserts. The combustion chamber is a modified hemisphere, with special contouring around the spark plug holes. Placed at the fore and aft ends of the camber, the twin plugs are properly close to the exhaust valve, and with a bore of over four inches are vital to proper ignition of a spread-out mixture.

Precedent is scorned in the design of the valve gear, which is about as wild as possible without resorting to desmodromics. Twin hairpin valve springs are placed in a fore-and-aft plane and close the valves through a collar retained by split keepers. Above this the tappets and camshaft are carried in separate cast light-alloy boxes, as in

the latest Singer and HRG engines. T-shaped in cross section, the alloy tappets are guided by their stems and carry thin rollers which protrude only slightly from the wide tops. The lower parts of the rollers themselves ride in vertical slots and thus prevent the tappet from rotating.

To ensure that this assembly is held in contact with the cam, a pair of very light concentric coil springs acts against each tappet only, leaving the hairpins to deal solely with the valves.

Shim clearance adjustment is provided, and current advice is to replace the tappet assemblies and their guides when the lateral lash exceeds .006 of an inch.

The separate tappet box allows through lubrication of cam and fol-

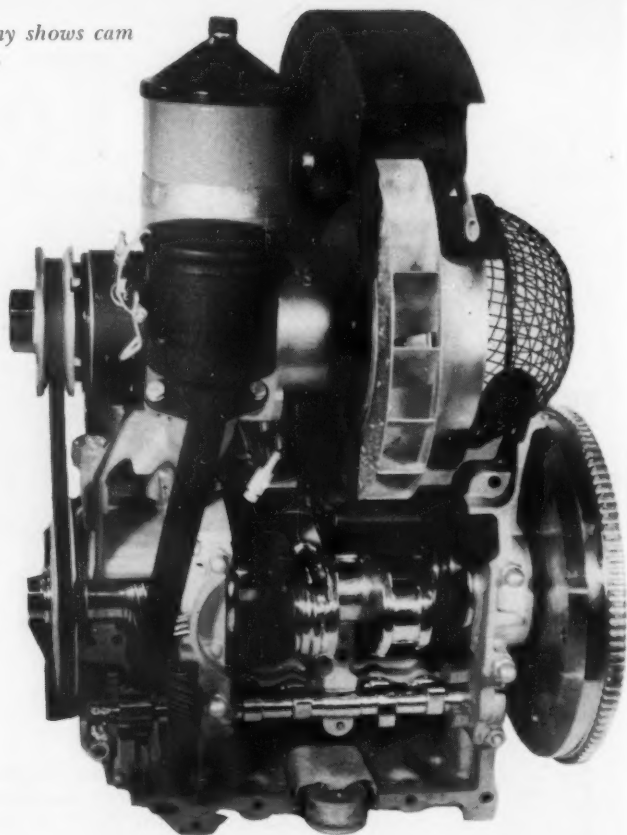
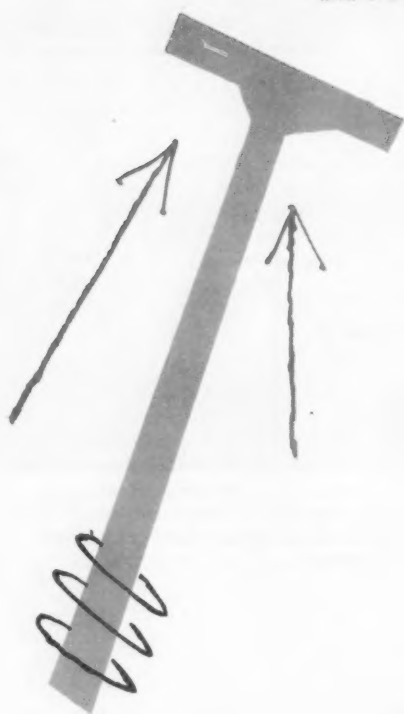
lowers without forcing leakage down the valve stems, and accounts for the unusually high and wide Monza cam boxes (No, that's not a V-8 in there, dear). Though the spring system may seem unduly complex, recall that it must take a beating from cams that provide 310° of intake duration and 98° of overlap. Lobes little more than ⅜ of an inch wide do the job, and are carried on large-diameter tubular shafts, which in turn rest in five plain white-metal bearings each.

Exhaust porting is impressive, the outer opening being flared considerably from the size at the valve. Properly tuned manifolding is used, with the cylinders paired 1-4 and 2-3, and these two later joined at a single expansion chamber. Induction plumbing

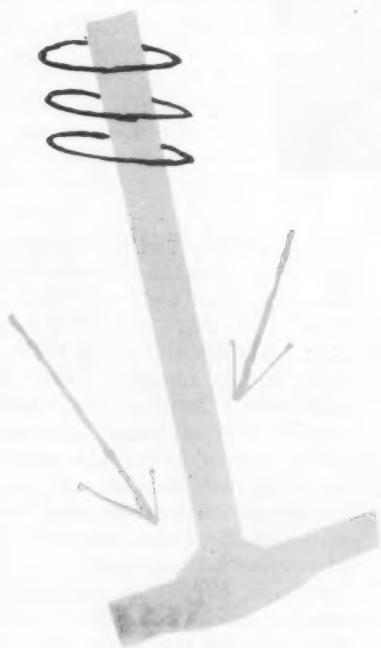
(Continued on page 62)

JUNE '56

Standard engine cutaway shows cam and crankshaft operation.



Four Cylinders Opposed



A sort of ultimate simplification,

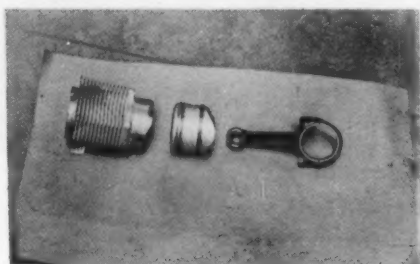
*Porsche's flat fours are among
the hottest in the world.*

THE large, varied line of Porsche engines represents a series of evolutionary refinements based on the humble VW power plant which also, of course, is an original Porsche design. When the full range of variations on this unorthodox theme is viewed from its People's Car beginning to its present competition-car culmination, we can begin to appreciate the really earth-shaking significance of the Porsche boxer motor. It's an amazing device from the standpoints of originality, versatility, simplicity, durability, efficiency, and performance. Its many forms are naturally confusing to anyone who has not been able to

Exhaust valve has high center so that if piston strikes valve, it will close it, not bend stem.



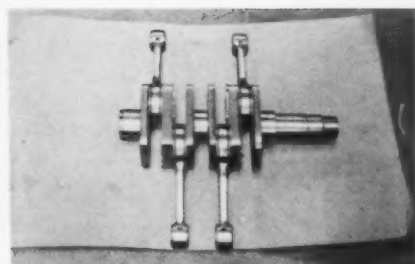
By GRIFF BORGESON



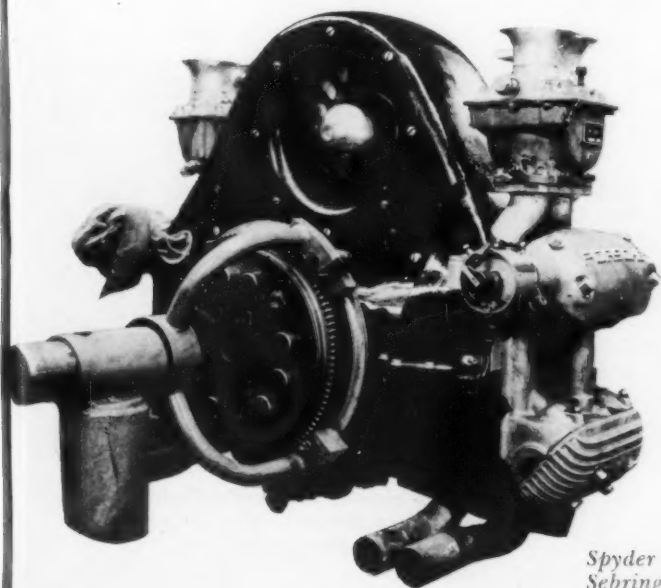
Cylinder, piston and rod assembly from 1600 engine. This is not a roller bearing connecting rod. Note oil ring below wrist pin.



Standard crankshaft journals are narrow but massive, with the mains running just under two inches. Bearings are hardened.



Hirth built-up roller-bearing crankshaft. Con rods are one piece and hand finished. Replacement price of unit—\$513.

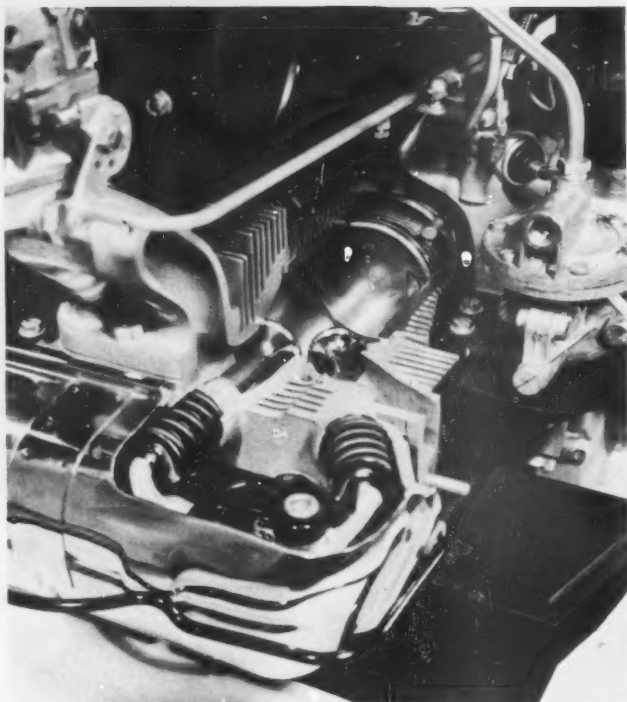


Spyder 1500 RS engine being prepared for Sebring. The dohc engine uses dual-throat Weber carburetors, and two separate ignition systems. Note small flywheel.

make a study of the subject and so we present here, for the first time, a survey of the whole spectrum of Porsche power plants.

The current line of engines manufactured by the firm called Dr. Ing. h. c. F. Porsche KG consists of the types shown in the accompanying table, the popular 1500 and 1500S having been replaced by the more lustily-endowed 1600 series. The 1100, 1300, and 1300S are paired with the coupe and convertible bodies. In addition to this choice of coachwork, the 1600 and 1600S also are supplied in the Speedster, a roadster or open two-seater. The same applies to the 1500GS Carrera. The appallingly potent 1500RS, with its unique ahead-of-rear-axle mounting, lives only in the Spyder, an all-out competition two-seater.

All of these engines share many of the same components. Some of these are crankcase, cylinder barrels, and cooling system. All of the "normal" engines — the 1100, 1300 and 1600 — share the same crankshaft, connecting rods, camshaft, and valve train. The S or Super engines all have Hirth roller-bearing crankshafts and special, ground-all-over connecting rods. The 1500GS and RS also have these organs, plus dual overhead camshafts, twin-throat carburetors, two-

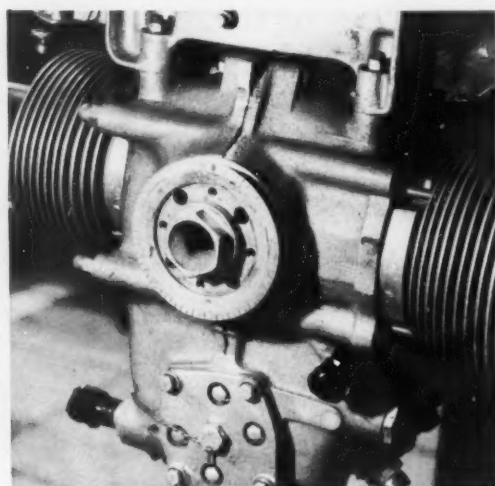


Partial cutaway of the 1600S engine shows intake and exhaust ports. Intake valve is .28 inches larger than the exhaust. Piston has flat top, bevelled edges, and exhaust valve relief.

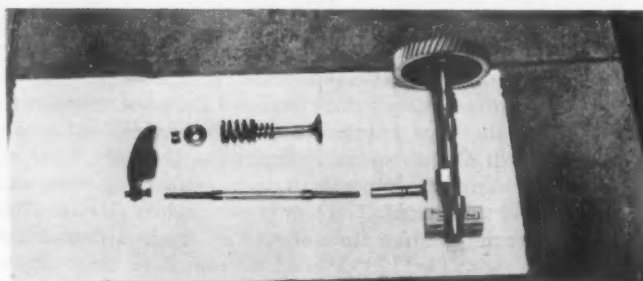
plugs-per-cylinder heads, and a separate ignition distributor for each set of plugs.

A moment's contemplation of the table shows the fantastic range over which this engine of such modest beginnings has been made to perform and, as the world knows, to perform well. Every forward step in the performance of Porsche cars has caused endless bother and embarrassment to the people who build the engine in its most economical form. From the earliest days of the Porsche the VW factory was assailed with customer complaints, all hewing to this line: "If Porsche can get more speed and acceleration from the VW engine, why can't the VW factory do the same?" The answer, of course, lies in the difference in price between VW and Porsche cars.

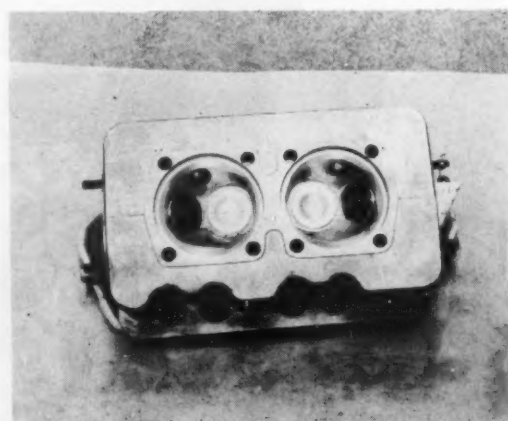
In the Porsche 1600 road test I mentioned that calculations based on pulling power and tractive resistance indicated that the test car was delivering more horsepower to the flywheel than its builders claimed for it — a very unusual occurrence. This caused me to doubt my own slip-



View of Spyder engine from fan pulley end. Timing degree marks can be seen on pulley. Engine is timed statically with 24° advance for each bank of cylinders. Advance marks must be at top center and aligned with vertical casing line.

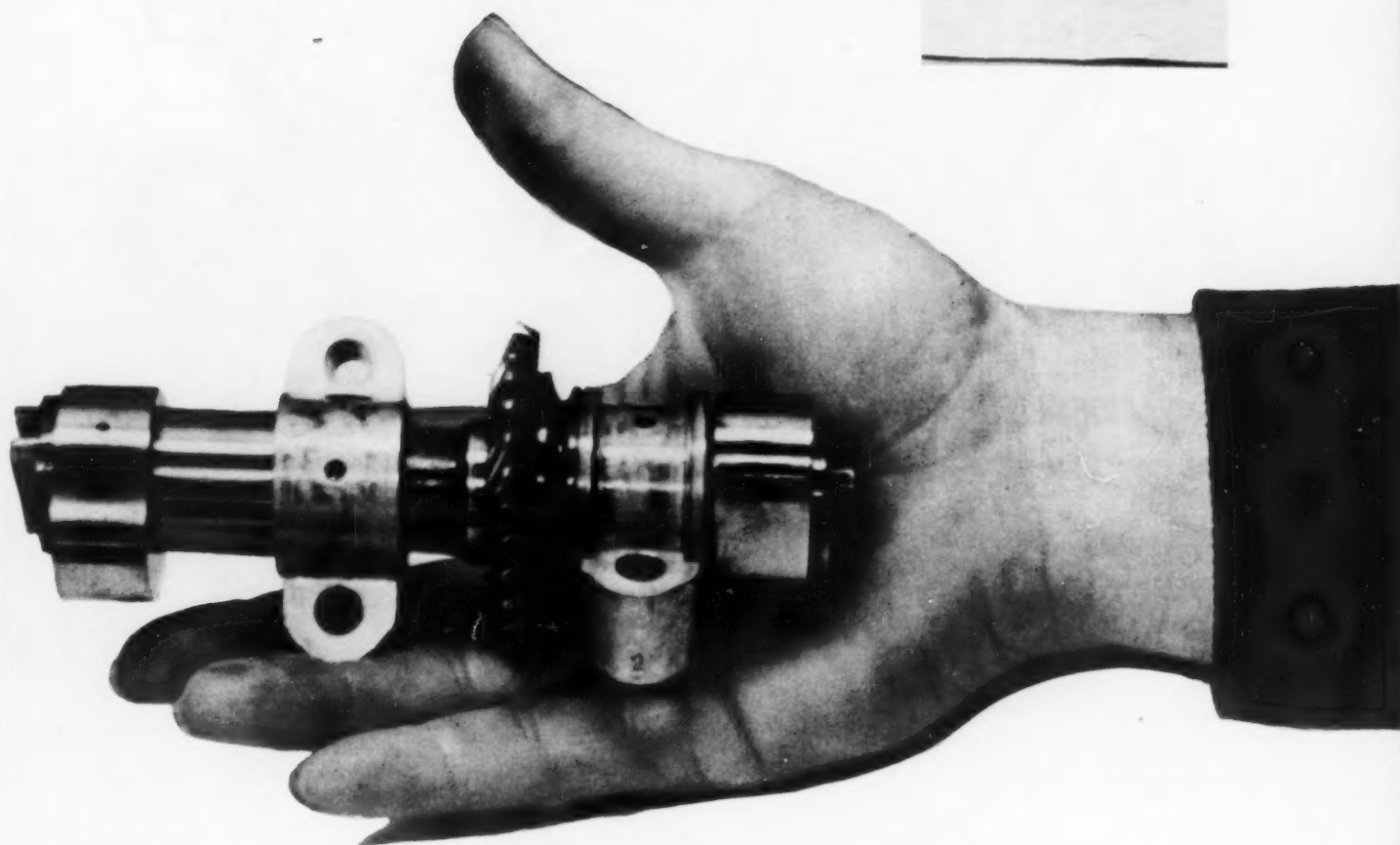
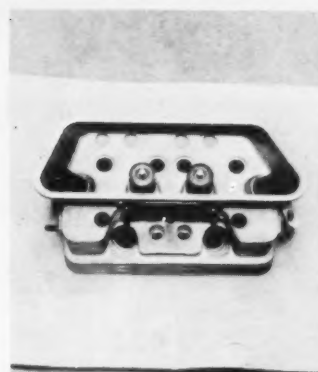


Valve train of standard engine. Pushrod is of light alloy with steel center section. Rods have same coefficient of expansion as cylinder-head assembly. Note blunt ends of camshaft. Valve clearances are .006 int. and .008 exh.



Bottom view of standard cylinder head which carries steel or bronze valve seats, valve guides, and plug bosses.

Top view of standard head. Note, deep and all around finning for optimum heat dissipation. Head is light alloy, easily removable.



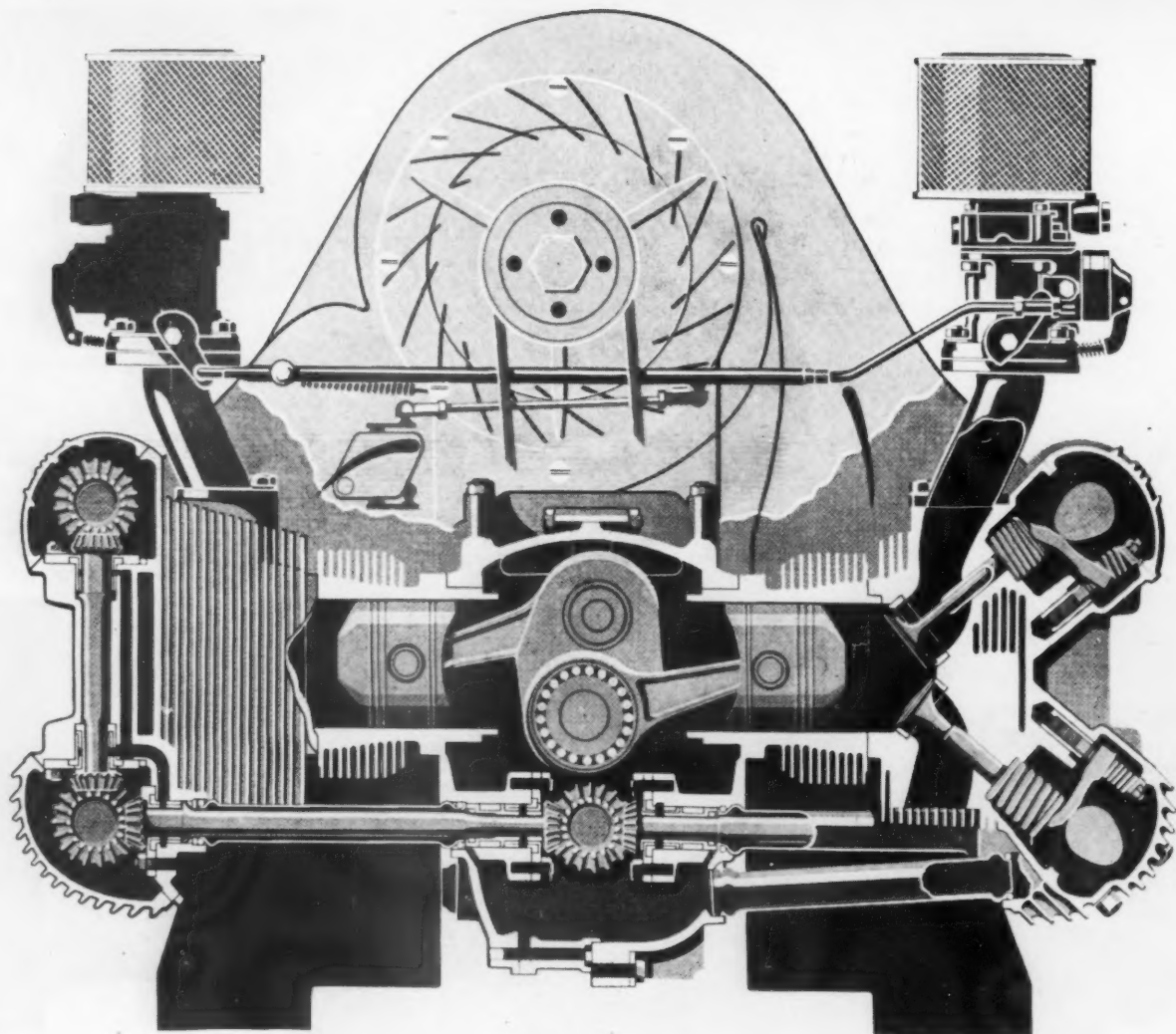
Part of overhead camshaft showing cam lobe, bearing, bevel gear, bearing, and second cam lobe. This cam operates the exhaust valves.

stickery and make inquiries. I learned from several owners who have had their cars on chassis dynamometers that they have run into the same surprising situation: power output was "a lot more than it ought to be." Finally I met Mr. Rolf Wuetherich, master mechanic from the Porsche factory who looks after company affairs in the American southwest. "Sure," he said. "It's our policy to keep all statements concerning performance on the conservative side. We've made quite a few solid friends that way."

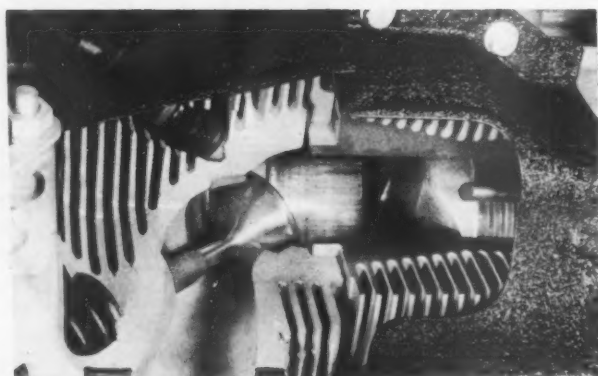
Results are a more compelling argument for the sale of a

small car than exaggeration of miniature horsepower figures. And when these brilliant little engines are coupled with chassis and bodies that actually *contribute* to their effective urge, the results pour in. Except for a rare, supercostly semi-prototype, Porsches dominate their classes in competition. The fact of consistent superiority gets the job done in the sales room.

Now let's talk engines. Basically, the Porsche is an air-cooled flat four with overhead valves. There are two cylinders on each side of the crankcase, which is mounted on



Cutaway showing working parts of dohc engine. Bevel gears drive camshafts. Con rods run on roller bearings at crank end. Note, domed pistons with oil ring below wrist pin.



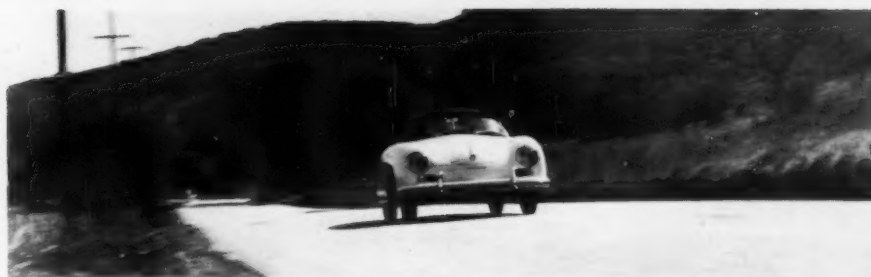
Partial cutaway shows intake valve, piston, and cylinder. Cylinders of all engines are of light alloy casting and do not use ferrous liners. Bores are chromium plated and lightly scored to hold oil film. Pistons are inverted-Vee type and do interfere with valves.

rubber blocks. Each engine is painstakingly hand-fitted and assembled and bears the initials of the skilled technician who performed the job.

The rigid, box-shaped crankcase is made of light alloy. It's in two pieces, split down the vertical center line. The main bearing bulkheads are narrow but massive and the mains are just under two inches in diameter — huge for such a small engine. There is a main bearing between each pair of crank throws, plus another main at the forward end of the crankshaft. Each of the main journals runs in solid, circular inserts except the No. 2 main, located between the front and rear cylinders. This runs in a split insert.

On older Porsche engines it was necessary to dismantle the crankcase in order to remove the camshaft. On the current engines this operation can be performed merely by removing the light-alloy cam-drive cover at the front of the case. If part of a crankcase is damaged both halves must be

Advanced characteristics of the Porsche enabled car to cruise at peak rpm indefinitely without injury to engine.



THE CURRENT PORSCHE ENGINES

	1100	1300	1300S	1600	1600S	1500GS (Carrera)	1500RS (Spyder)
Piston displacement	1086 cc 66 cu. in.	1290 cc 79 cu. in.	1290 cc 79 cu. in.	1582 cc 96.5 cu. in.	1582 cc 96.5 cu. in.	1498 cc 91.4 cu. in.	1498 cc 91.4 cu. in.
Bore & stroke	73.5x64mm 2.89x2.52 in.	74.5x74mm 2.93x2.91 in.	74.5x74mm 2.93x2.91 in.	82.5x74mm 3.25x2.91 in.	82.5x74mm 3.25x2.91 in.	85x66mm 3.35x2.60 in.	85x66mm 3.35x2.60 in.
BHP (SAE)	47 @ 4000	51 @ 4200	70 @ 5500	70 @ 4500	88 @ 5000	115 @ 6200	137 @ 6200
Torque (DIN), lb-ft	54 @ 3300	60 @ 2800	65 @ 3700	82 @ 2700	86 @ 3700	94 @ 5500	95.5 @ 5500
Compression ratio	7.0	6.5	8.2	7.5	8.5	8.7	9.5
Valve drive	Pushrod	Pushrod	Pushrod	Pushrod	Pushrod	DOHC	DOHC
Valve timing:							
In. opens BTC	2° 30'	2° 30'	19°	2° 30'	19°	38°	38°
In. closes ABC	37° 30'	37° 30'	54°	37° 30'	54°	78°	78°
Ex. opens BBC	37° 30'	37° 30'	54°	37° 30'	54°	78°	78°
Ex. closes ATC	2° 30'	2° 30'	19°	2° 30'	19°	38°	38°
Valve diameter:							
Inlet	1.50 in.	1.50 in.	1.50 in.	1.50 in.	1.50 in.	1.875	1.875
Exhaust	1.22 in.	1.22 in.	1.22 in.	1.22 in.	1.22 in.	1.5625	1.5625
Carburetor throat diam.	1.26 in.	1.26 in.	1.26 in.	1.26 in.	1.58 in.	1.58-in. dual	1.58-in. dual
Spark plugs per cyl.	1	1	1	1	1	2	2
Connecting rod bearings	Plain	Plain	Roller	Plain	Roller	Roller	Roller
Lubrication	Conv.	Conv.	Conv.	Conv.	Conv.	Dry sump	Dry sump
Bore: stroke ratio	0.87	0.99	0.99	0.89	0.89	0.78	0.78
Piston speed @ max. bhp	1680	2040	2670	2180	2425	2690	2690
Bhp per sq. in. piston area	1.79	1.89	2.60	2.11	2.65	3.26	3.89
Bhp per cu. in.	.71	.65	.89	.73	.91	1.26	1.50

replaced; they come as fitted parts.

All con rod small ends contain bronze bushings. The 1100, 1300 use VW big-end inserts, and 1600 engines use lead-bronze big-end inserts which are interchangeable with the 1500. The 1300S, the 1600S, and the 1500RS and GS use normal main bearings but the rod big ends run on rollers. This is accomplished by means of built-up crankshafts and special, hand-finished, one-piece con rods. The roller-bearing shaft with a set of fitted rods packs a replacement price of about \$513. In the case of either standard or Hirth roller crank, the flywheel is located by means of a single, central hollow bolt and eight locating dowels — an excellent, simple and handsome arrangement. The standard con rods are stubby H-section forgings with huge big ends. The bearing surfaces of all cranks are hardened.

The pistons in all Porsche engines are of the full-floating type, the wrist pins being secured by lock rings. Pistons for-

the various engines differ widely. All use two compression rings and one oil ring and these are arranged conventionally on the 1100 and 1300. The other engines use pistons on which the oil ring is mounted below the wrist pin and close to the bottom of the skirt. The 1100 piston has a domed crown with flyout clearance for the exhaust valve. The 1300's piston has a narrow, inverted-vee crown which requires no valve relief. The 1500 GS and RS use hairy, domed pistons with pronounced valve relief on two sides of the dome. The 1600 piston has a flat top and the pistons for the 1300S and 1600S have high flat tops with bevelled edges and exhaust valve relief.

The cylinders of all these engines are light alloy castings which do *not* use ferrous liners. Instead, the bores are chromium plated, then lightly scored to give a foothold to the oil film. This novel procedure is not as radical as it may

(Continued on page 55)

JUNE '56

SCI

*"...the emphasis is
definitely on flexibility..."*

ROAD TEST: the Austin Healey



Coming out of a right angle bend, the Austin-Healey dips low at the rear, displaying slight under-steer. Yet drifts and power slides were executed with near perfect control.

OBSERVERS were dumbfounded when Stirling Moss turned up at the Nassau races with nothing more potent than Austin-Healey 100S. "Can't he get a faster ride than that?" "Why doesn't somebody help him out?"

Actually, Stirling was offered one of Luigi Chinetti's Ferraris, and would have been a welcome man on any other team. He was simply down there for fun, not work, and

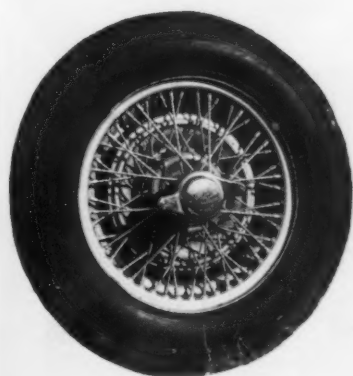
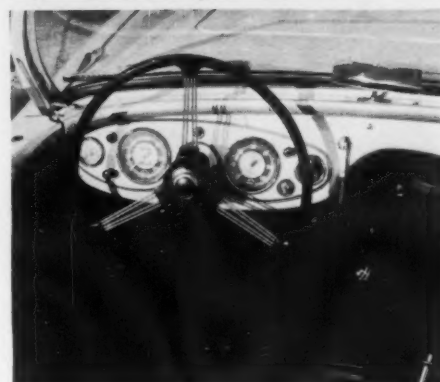
The A-H top is easily raised or stowed. Side curtains will not keep out extreme weather, although heater is more than sufficient. Plastic hardtop can be bought for Austin-Healey from several private manufacturers.



At 55 mph, the A-H leans into a tight turn without sway or drift. Excess of flexibility at the rear is noticeable when cornering hard on rough surfaces. Use of Panhard lateral rods helps minimize rear axle oscillation.



The instruments are neatly balanced for the aesthetic eye, but are placed too low for a quick reading. Note, overdrive toggle switch next to tachometer. Cockpit is comfortable for six-footers too.



New brake drums of A-H 100 are wider than previous model. This, combined with improved linings, makes the brakes almost fade-proof.

wanted a car with which he could enjoy himself while making full use of his considerable talent. Basically identical to the 100S, the standard Healey retains this dual personality. It can be a smooth and easy fun car for puttering around, and yet will respond eagerly in the hands of the demanding expert. Like a good boxer, it can very rarely be caught off balance.

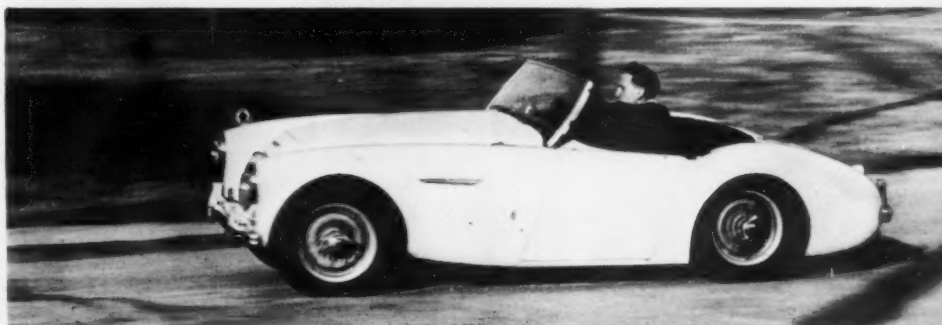
1956 has brought the first marked change in the Austin-Healey since its triumphant introduction in October of 1952. It rapidly established itself as a worthy and popular sports car, and is seen both on the courses and in the spectator parking lots. Increasing use in competition taught the Austin Company much, and some of this knowledge is reflected in the 100M and 100S models. At last the regular

line is getting the benefit of this experience, for all the changes reflect an awareness of racing requirements.

High on the list is the widening of brake drums and shoes from 1 3/4 to 2 1/4 inches. Combined with improved linings and the cooling allowed by wire wheels, this makes the brakes very nearly fade-proof. Their action is not light, but rather completely consistent and proportional to pedal effort. Smooth, straight-line stops were the rule, but emergency conditions caused rear wheel locking, thus suggesting that the rear is now if anything overbraked. The hand brake lever between the tunnel and the right hand seat is convenient and effective, though its recessed position when off makes it tough to grab in a hurry.

Older Healeys had a somewhat awkward three-speed

On long, slow corners, the Healey-100 showed itself to be responsive and light with a minimum of wheel fight. Note, that while there is some roll, it is not excessive.



Photos by Don Tyron

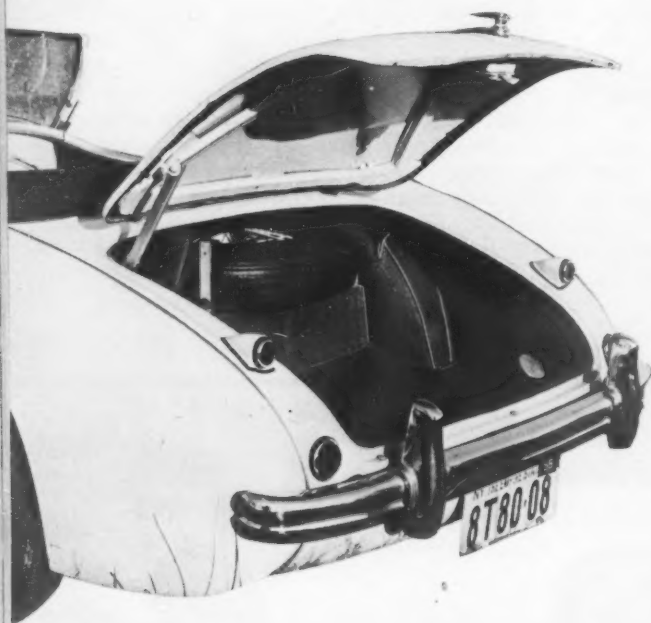


Large back window in Austin-Healey top affords excellent rear traffic view.

Cornering fast and hard, Austin-Healey-100 shows excess flexibility at the rear. This causes understeer on turns but gives little feeling of insecurity. Turn was taken at higher speed than would be normally advisable.



The 2660 cc engine sits snugly within the engine compartment. This little power-plant develops 90 bhp at 4000 rpm. Tight layout makes for some difficulty in minor service.



gearbox augmented by an overdrive arrangement that did a lot of the driver's thinking for him. This was easy around town but clumsy around Watkins Glen, and it was good news to hear that a four-speed box was being made standard, in combination with a manually-controlled version of the Laycock-de Normanville overdrive.

A C-type B.M.C. transmission is used, with special close ratios and gear selectors on the left hand side. No remote control is used, so the rather long gear lever is raked well back from its forward pivot. A noncommittally round knob carries the standard "H" shift pattern, with reverse to the left and rear. In action the lever travel is very long from first to second, with the knob near the dash in the former, and not much shorter from third to fourth. In contrast the sideways movement is very small, and a considerable kick is needed to get by the spring loaded reverse latch-out.

The strong synchromesh on the top three gears is provided with a certain amount of blocking action, and as a result shifting is slow and deliberate, though clash-free. Movement from second to third is hampered by selector imperfections which can hang you up in neutral if you try to rush it through. Oddly for a sports car the gears are utterly quiet in all ranges, and the chances are that the heavy insulation around the transmission absorbs both heat and sound.

Gearbox ratios were themselves well spaced, though the low rear axle ratio limited the useful speeds in gears. The overdrive, of course, made up for this at cruising speeds, but up to that point the four gears don't seem to be used

Looking very much like its predecessor, the A-H-100 has some new changes — a four speed gear box, and larger braking surfaces. Low ground clearance helps car hug roads at high speeds.



to best advantage. Operative in the top two gears, the overdrive engaged smoothly and rapidly, though it tended to take its time after a few power shifts into third OD. While it would be hard to reach in competition, the controlling toggle switch is an easy hand's flick under the wheel on the right. Upshifts occur with switch movement, but a downshift waits for slight throttle depression. It is thus possible, for example, to preselect direct fourth while cruising and engage it when needed by tromping down.

Other fun and games can be had by leaving the switch in "overdrive", in which case you will start from rest in regular first and second and then shift right into third OD. A good regular sequence is first, second, third, third OD and fourth OD, which provides five well-spaced ratios. No more can be found, anyway, since fourth direct and third OD are virtually identical, the latter being slightly lower. Since this was the case, I expected fractionally better 50-70 times in third OD. As the data table tells, direct top had the edge, and it seems that the extra drag and inertia of gearbox and overdrive gears more than negated the slightly higher engine power available.

Though it was rugged and silent, the transmission was generally a letdown in its rough shifting and low overall ratios. A little adroit file or grinder work would smooth out the gate, though not the synchromesh action, and a slightly higher back axle ratio would make the overdrive a true cruising gear and not a substitute for top gear.

Actually, with the Austin-Healey any discussion of the

(Continued on page 65)

SPECIFICATIONS AUSTIN-HEALEY 100

ENGINE

Cylinders	4 in line
Bore and stroke	3.44 in x 4.37 in (87.3 mm x 111.1 mm)
Displacement	162 cu in (2660 cc)
Compression ratio	7.5:1
Max. horsepower	90 bhp @ 4000 rpm
Max. torque	144 lb/ft @ 2000 rpm
Max. b.m.e.p.	134 psi

CHASSIS

Wheelbase	90 in	
Front track	48¾ in	
Rear track	49½ in	
Curb weight	2360 lbs	
Front/rear distribution	48/52	
Test weight	2670 lbs	
Turns lock to lock	2.5	
Turning circle	30 ft	
Gear ratios:		
<i>Gear</i>	<i>Direct</i>	<i>Overdrive</i>
4th	4.10	3.18
3rd	5.46	4.24
2nd	7.85	
1st	12.60	
Rev	17.10	
Tire size	5.90x15	
Brake lining area	188 sq in	
Fuel capacity	12½ gal	

PERFORMANCE

TEST CONDITIONS

40° F, light side wind, dry concrete surface at sea level.
Top and side curtains erect, two aboard. Mileage on test car: 3000

SPEEDS IN GEARS

Gear	True mph (Car)	
4th OD	100	(108) @ 4100 rpm
Best run	101	
4th	96	(103) @ 4900 rpm
3rd OD	93	(98) @ 5000 rpm
3rd	67	(70)
2nd	49	(50)
1st	29	(29)

ACCELERATION

Range	Time, Seconds	Gears Used
0-30	3.6	1st
0-40	5.9	1st, 2nd
0-50	8.6	1st, 2nd
0-60	11.6	1st, 2nd, 3rd
0-70	16.2	1st, 2nd, 3rd, 3rd OD
0-80	23.0	1st, 2nd, 3rd, 3rd OD
50-70	7.9	3rd OD
50-70	7.7	4th
Standing 1/4 mile	18.1	1st, 2nd, 3rd, 3rd OD
Speed at end of quarter	73 mph	

FUEL CONSUMPTION

Hard driving	19 mpg
Town/Country use	24 mpg
Country use	27 mpg

the 12 Sebring, 1956: busiest hours -



Photos by Irv. Dollin, Dan Rubin, John Christy

While spectators wait for the last of the cars to check in, the scoreboard indicates final rundown of results. Numbers show order of winners.

IN the postmortems that followed the Sebring 12 hour enduro, the consensus among the world's top drivers was that one lap around the 5.2 mile Florida course was equal in car punishment to two laps of the 10-plus miles at Le Mans, judging by past years.

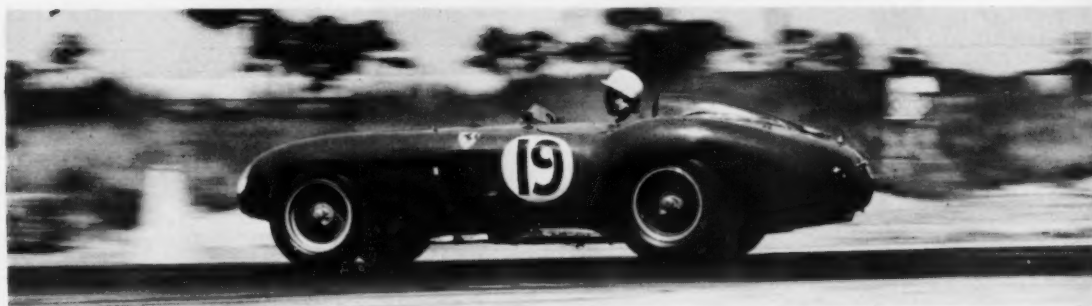
The record bore this out. By the time Juan Manuel Fangio and Eugenio Castellotti had completed 194 record-breaking day and night laps to win, 38 other cars had dropped by the wayside.

The pace was blistering from the start. When the flag dropped at 10 a.m., John Fitch pulled off the line first in a modified Chevrolet Corvette, leaving rubber like a dragster. His lead lasted only until the first turn when Mike Hawthorne in a Lucas-injected factory D-Jaguar caught him at the first turn and charged into the lead. In quick succession Stirling Moss in a straining Aston Martin DB3S, Indianapolis winner Bob Sweikert in another D-Jag and Fangio in a factory 3.4 Ferrari got into line in that order. The terrific torque put out by the bored and stroked Corvette wasn't enough to overbalance the sheer speed put

out by the smaller engined English and Italian machines and Fitch wound up back in the pack but not so far back as some doubters had predicted earlier. Twelve hours later he and Walt Hansgen were still in contention, ending up ninth overall — no bad showing.

Within a few laps, Fangio had caught and passed Sweikert and set out after Moss. Despite the pressure, Moss managed to keep the badly overmatched Aston ahead of Fangio, disregarding the fact that the Aston engine was giving away 30.5 cubic inches to the 3.4 Monza. Hawthorne made every effort to stretch his lead but could never get more than half a mile or so ahead of the dueling pair. This lasted for over three hours until the "come in" signals appeared for Hawthorne and Moss. Moss turned the Aston over to Peter Collins and Hawthorne turned his car over to Ireland's Des Titterton. During the few seconds, the Aston and the Jag were in the pits, Fangio grabbed the lead for the first time. Further back, Sweikert changed places with Jack Ensley and Phil Hill turned the Nassau-winning Tilp Ferrari over to Masten Gregory for what was to be a

Marquis de Portago just before the Ferrari split a valve and ruined the chances of "miracle order" team finish — 17, 18, 19.



Mike Hawthorne's leading Jaguar entered pits with broken brake line. Despite frantic effort to put car into race, crew failed to make repairs.

short, hot and uncomfortable 20-minute ride until the oil-throwing 3.5 Monza seized a rod. Collins' ride was also short; the Aston's strained gearbox hung up in high gear putting both the car and the team's top drivers out of the running.

Fangio hung onto his lead until he also was called in for gas, oil, tires and driver change, a stop that took only seconds but long enough to allow the Hawthorne-Titterington D to go into the front spot again. The lead swapped back and forth each time pit stops were made. The only time the one-two combination was broken was at the third hour when the three-litre Maserati, driven by Piero Taruffi and Jean Behra, briefly held down the second spot. The Maserati ran steadily through the whole 12 hours to finish fifth overall and second in class behind the lone Carroll Shelby—Roy Salvadori Aston Martin to last the distance. The extra 30 cubic inches carried by the Ferraris and Jaguars proved just too much to be overborne by the Maserati.

The lead swapping combination was finally broken for good at 8 p.m. when Hawthorne's Jaguar broke the right front brake line and dropped out after bleeding off most of the brake fluid. With Hawthorne and Titterington out, the Ferraris had it all their own way just by playing it cautiously. A second Ferrari team car driven by Luigi Musso and Harry Schell moved into the second position, ten miles behind the leader. The third team Monza driven by "Fon" de Portago and Jim Kimberly had dropped out earlier when a cylinder loaded up with fuel after a pit stop and knocked out an exhaust valve, killing the chance of a one-two-three victory for the men from Modena.

The winning team of Fangio and Castellotti acknowledging congratulations. The victorious duo swapped lead with Hawthorne and Titterington during first 10 hours.

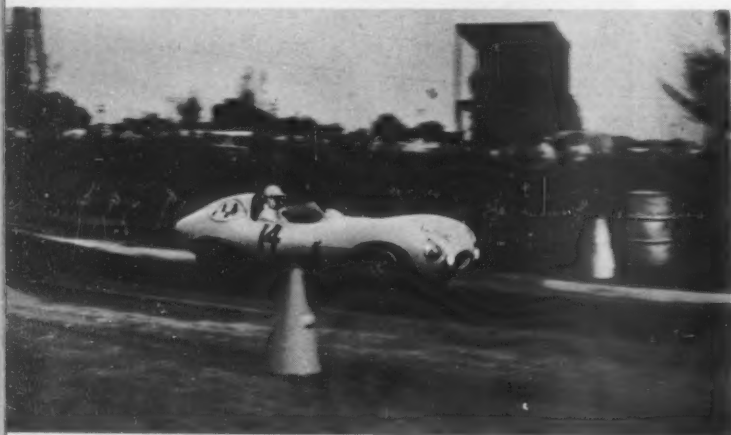




Aston-Martin pitwork was excellent: here a crew changes brakes, getting car out in 2½ minutes total time.



Eventual co-winner Juan Fangio charges through a fast right bend with the factory team Ferrari. Tach tell-tale showed car never revved past 6100 rpm.



1955 Indianapolis winner Bob Sweikert placed 3rd with co-driver Jack Ensley. Here he goes through Esses at dusk.

Sweikert and Ensley had been forced back into the pack but not too far — only once was their white D-type lying worse than 10th. Now Sweikert moved in rapidly, eating up the distance between the D and the Musso Ferrari. As the 12th hour flag dropped the Sweikert-Ensley team was in third position, but six laps behind Castellotti.

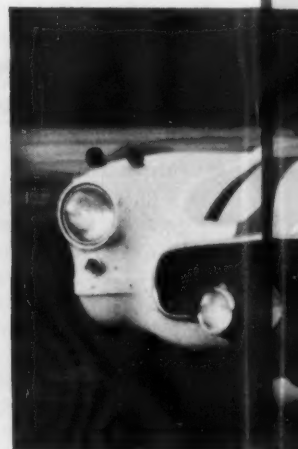
A second battle had also been going on between the Porsche 550 Spyders and the single tiny French Deutsch-Bonnet, driven by Paul Armagnac and Rene Bonnet, remaining in the race. The Porsche had their class won but were attempting to take the Index of Performance handicap, a prize which is virtually the private property of the D-B cars in international racing. For over eight hours the little French machine thrashed its 45 cubic inches to keep mathematically ahead of the factory Porsches driven by Hans Hermann and Count von Trips and the private, John Edgar, entry handled by Pete Lovely and Jack McAfee. A



Harry Schell in Ferrari moves up to pass Pete Lovely, left, in Porsche. Both cars placed 2nd in their classes.



Aston-Martin team car driven by Stirling Moss ran 2nd for three hours holding off much larger Ferraris.



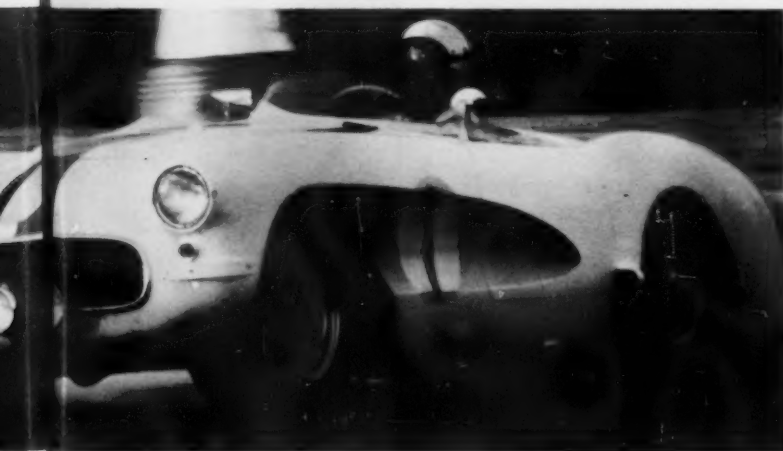


Fuel injected D-type Jaguar screams through the first turn of the road section. Car was fastest in race.

piece of bad judgement concerning the amount of fuel left in the tank dropped the D-B out of Index contention but not out of the race. The two Porsches ended the enduro 1-2, in both Index and class categories.

Team of the day, however, was made up of three white MG-A's. Led by Team Captain David Ash, the MG team was the only one to finish the entire race intact and together. A final pit stop half an hour or so before the finish allowed the team to sort themselves out and finish not only together but in numerical order — 49, 50 and 51 — as they crossed the finish line. Top team organization was displayed by the Aston Martin crew. The strategy was obvious as Moss barreled out ahead during the early laps while Shelby and Reg Parnell in the other two cars flew formation back in the pack. The pit crews were perfectly drilled. Team cars were equipped with spot brakes employing arc-shaped spots and each was scheduled for a brake change during the race.

Modified Chevrolet Corvette was driven by John Fitch and Walt Hansgen to 9th spot. Car packed brutal torque but lacked top speed shown by European machinery.



The MG team comes across the finish line in numerical order, the only team to finish completely intact.

A stopwatch on one of these brake-change stops showed that the car was given a new set of front spots, fuel, tires and a driver change in just two and a half minutes or a full minute under the lap times being set at that point.

FIA sanctioned, attracting the world's greatest drivers and factory teams, Sebring '56 was the best yet, marred only by one accident and a not-too-serious lack of coordination in organization. The accident was virtually unavoidable, a case of a driver, Carlos Menditeguy in a Maserati, coming into a left-right-left series of turns and finding too late that his normal approach line was blocked by a slower car which had every right to be where it was. The result was a flip and rather serious but not critical injuries to Menditeguy. The organizational faults, primarily centering around a plethora of chiefs and a lack of Indians, are certain to be corrected as Sebring takes its place among the top international racing events each year. #

RESULTS

OVERALL

Car	Drivers	No. of laps
1. Ferrari,	Fangio-Castellotti	194
2. Ferrari,	Musso-Schell	192
3. Jaguar,	Sweikert-Ensley	188
4. Aston-Martin,	Salvadori-Shelby	186
5. Maserati,	Behra-Taruffi	186
6. Porsche,	Hermann-von Trips	182
7. Porsche,	McAfee-Lovely	179
8. Jaguar,	Mena-Gonzales	176
9. Corvette,	Fitch-Hansgen	176
10. Ferrari,	Rubirosa-Pauley	172

CLASSES

Class B:	Corvette,	Fitch and Hansgen
Class C:	Ferrari,	Fangio and Castellotti
Class D:	Aston-Martin,	Salvadori and Shelby
Class E:	Ferrari,	Rubirosa and Pauley
Class F:	Porsche,	Hermann and von Trips
Class G:	Cooper,	Leech Cracraft and Red Bryon
Class H:	Deutsch-Bonnet,	Rene Bonnet and Paul Armagnac

INDEX

1-Porsche,	Hans Hermann-Count von Trips	1.347
2-Porsche,	Jack McAfee-Peter Lovely	1.325
3-Ferrari,	Juan Fangio-Eugenio Castellotti	1.310
4-Deutsch-Bonnet,	Paul Armagnac-Rene Bonnet	1.302
5-Ferrari,	Luigi Musso-Harry Schell	1.289
6-Aston-Martin,	Roy Salvadori-Carroll Shelby	1.274
7-Jaguar,	Bob Sweikert-Jack Ensley	126.9
8-Maserati,	Jean Bera-Pietro Taruffi	126.5
9-Ferrari,	Porfirio Rubirosa-Jim Pauley	126.4

West Coast Competition

Palm Springs

SPONSORING road races is a hectic business and no one appreciates this more than the Los Angeles Region of the Sports Car Club of America. Following a series of financially disastrous ventures, the club felt they had finally found a solution to their problems for their first crack at racing at Palm Springs, long monopolized by the California Sports Car Club. But before the first entry had even been received, accusations of professionalism bombarded them from all angles.

With most of their bookkeeping being done in red ink, club officials had gotten together with Mac and Mert Haskell, operators of the air strip, and promoter George Cary. The trio agreed to supply necessary finances in return for all cash, except the entry fees, that were taken in. With the professional-amateur controversy curling the pages of the West Coast press, this was enough to ignite advocates of "pure" amateur competition.

SCCA officials refused to be stampeded. Ignacio Lozano, club president, flatly stated: "We are not in the business of promoting races, but interested only in giving our members a chance to have a little fun. We are never interested in making money. We are a non-profit corporation. We depend on our sponsors to put up the money."

The main event gave the collected fans little to enthuse over, with the exception of some excellent driving, as Carroll Shelby stroked to victory in Tony Parravano's 4.9 Ferrari. Shelby grabbed the lead on the back straight during the first lap and that was that. He finished nearly a minute ahead of the John Edgar 3.5 Ferrari driven by Jack McAfee.

Faulty carburetion helped make for a rather disappointing showing by the newly imported Italian mount.

Bill Murphy, handling his big Kurtis-Buick with more ease than has been apparent in past events, finished third.

Actually, much of the anticipated competition never got onto the starting grid. Ernie McAfee, entered in Bill Do-



Kunstle's victory was a surprise to most of the fans who thought Miles was just laying back until late in the race.

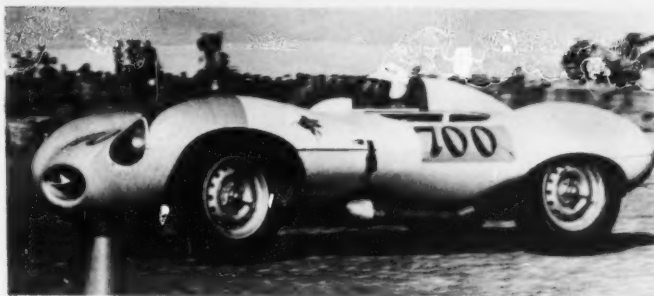
As Shelby crosses finish line, Al Torres gives one of his special finishing signals. Later, guards mistakenly let crowds through, clogging starting line, and causing two cars to be marked DNF until later that evening.

Photos by Art Connell



nReport

By JIM MOURNING



Woods held lead at the beginning but kept it only half a lap before Shelby went around him.

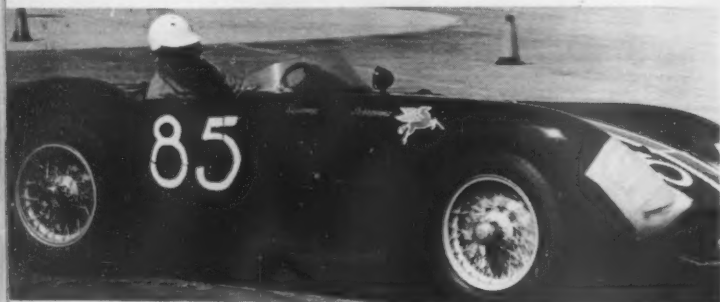




Jimmy Orr maneuvers his Ermini through a turn. Car failed to finish because of water leak. Despite fast appearance, it failed to perform as expected.



Concentration marks Phil Hill's attempt to bring Porsche Spyder through turn. Hill ran well up in the pack, despite spin out, when mechanical trouble developed.



Carroll Shelby slides Tony Parravano's 1.5 liter Maserati through turn three. Gear box failed and car went out early in race.

heney's 4.4 Ferrari, developed transmission trouble during practice and Phil Hill withdrew because of a "loose cylinder sleeve" in Johnny von Neumann's Ferrari Monza.

With much of the potent competition sitting it out in the pits, main contention to Shelby was figured to come from a pair of D-Jaguars. But shock absorber problems forced Pearce Woods out on the 18th lap and the best an improving but still lacking Lozano could do was a fifth, finishing well over a lap behind the leader.

It was the race for modified cars under 1500 cc that supplied the big surprise and nearly all the tight action during the two days as the Porsche Spyders moved into the first four spots and had a race of their own. The surprise came as the crowd, long accustomed to seeing Ken Miles finish in front, watched Jean Kunstle lead the lean Englishman across the finish line by nearly five seconds. Although Kunstle led all the way, Miles had whittled his margin to a half second at one point.

Jack McAfee, showing occasional flashes of his old form, finished third, nearly two minutes behind the leader, but over a lap ahead of the fourth place car.

Phil Hill made his only appearance of the week-end by taking his first shot at a Porsche Spyder, another von Neumann entry. He was running third when a bent shifting fork forced him out on the 17th lap.

In the event for Class C and D production cars, Rudy Cleye, the lanky restaurateur, made it five in a row with his Mercedes 300SL as a race that started as a runaway turned into a tight battle. Despite apparent difficulties that materially reduced the car's speed, Cleye was able to eke out a split second victory over Tony Settember's Mercedes 300SL on the strength of a vast edge built up during the early going.

Interest in the second race of the day was centered around the debut of the Porsche Carreras, which were pitted against the Porsche Supers, Austin-Healeys and Class E cars in an experiment in race programming. Dale Johnson finished one of the cars second, some three seconds behind winning Skip Hudson in a Porsche Super Speedster. The second Carrera failed to finish.

The opening race on Sunday's schedule brought a shock to many self-styled racing experts as E. Forbes-Robinson, Jim Parkinson and Harry Hanford took their trio of Mg-A's onto the circuit and manhandled the Porsche contingent with apparent impunity. Ed Tomerlin's Porsche Speedster was the only car able to split the combination, finishing 12 seconds behind the winning Forbes-Robinson. The car was later disqualified for a violation of technical regulations. #

Four Cylinders

(Continued from page 43)

sound, having been developed and proved in German motorcycle practice. The hard chrome finish is amazingly wear resistant. I know of one Porsche owner who now has 82,000 miles on his engine and it still shows no sign of requiring a rebore. If it should reach that stage as it must eventually, he will not have to invest in new cylinders. Lockheed will rechrome the original ones for a modest price. Each Porsche cylinder, new or replacement, comes with its own piston, tailored to fit. The sloppy clearances popularly associated with air-cooled engines don't apply to the Porsche. The 1300 and 1300S, for example, use pistons that are only six-tenths of a thousandth of an inch smaller than their cylinder bores.

Each bank of two cylinders carries a common, removable light-alloy head which, like the barrels, is deeply finned for optimum cooling. The head contains steel or bronze valve seats, valve guides and spark plug bosses. The cylinders are spigoted to permit the heads to fit down around them and no head gaskets are required.

The overhead valves of all but the 1500GS and RS are pushrod operated and are arranged in a wedge-shaped variation on the vee-inclined theme. The camshaft rides in three bearings and is driven by a light-alloy helical gear. With admirable simplicity, each lobe on the camshaft alternately operates one valve of two opposed cylinders, by means of pushrods and rocker arms. Mushroom-type cam followers act on the pushrods, which are of light alloy with a steel center section. This bimetal combination has a coefficient of expansion practically identical with that of the head and block assembly. Valve lash is adjusted conventionally at the rocker arms.

The 1500 GS and RS are full-race versions of the foregoing engines, as a glance at the table shows. The heads of these engines have true hemispherical combustion chambers, classically vee-inclined valves, two spark plugs per cylinder, and dual overhead camshafts. That adds up to four camshafts for the engine.

These cams are driven by shafts and bevel gears. Instead of using conventional, somewhat clumsy Oldham-type couplings, the main cam-drive shafts are jointed by means of male and female splines. These permit changes, including compression ratio and cylin-

der height, to be made with no modification of the cam drive.

The lobes on these d.o. cams are enough to quicken the pulse of any roller tappet devotee. They're as blunt as the end of a broom handle and act upon radiused finger-type cam followers.

The followers are heavily spring-loaded and ride on adjusting buttons placed over the valve stems. The exhaust valves are sodium cooled and their heads are higher at the center than at the periphery so that, if a piston should hit a valve, it will close it, not bend it. Double-nested valve springs are used in all the Porsche engines.

The cylinders and heads are cooled by means of ducted air that is forced by a powerful fan driven by an adjustable v-belt pulley on the crankshaft. An oil cooler also is mounted in the path of cool air flow and all lubricant must pass through it before it reaches the engine's bearing surfaces. Correct viscosity of the oil is maintained in cold weather by means of a by-pass valve ahead of the cooler.

All oil passages in the crankcase, blocks and heads are lined with copper tubing. The lube system delivers pressure oil to all friction surfaces with the exception of cylinder walls and wrist pins, which are splash-lubed. On the 1500GS and RS engines a single pump handles both oil feed and scavenging. In addition to a conventional cartridge-type oil filter the system includes a large "magnetic filter" in the bottom of the sump for extracting ferrous particles from the oil.

The Porsches use a single-plate dry clutch built into the flywheel; the clutch pressure-bearing requires no maintenance. If there is an Achilles' heel to these engines, the clutch is it. This is not necessarily because of any defect inherent in the robust 7.13-inch clutch but is more a function of driving conditions and techniques. Protracted drag racing from traffic light takes its toll and changes a delightfully soft and easy clutch into a rough one. The Porsche is built to tolerate hard use but leadfoot owners will do themselves a favor by not expecting the clutch to live out its life constantly slamming into a flywheel spinning at 4000 revs or more.

The pair of Solex carbs fitted to Porsches have generous acceleration pumps. The engine can be brought to life on the coldest morning with just

a couple of tromps on the throttle pedal before the starter button is pressed. Throttle priming should be done with restraint; it's an easy engine to flood if you're careless.

Although the two carbs are nearly a yard apart, the linkage that joins them is tight, positive and substantial. All engines but the hot 1500's have single-throat carbs. The GS and RS come with Solex-twin-throat units and are often fitted with twin-throat Webers for competition; with linkage and manifolding they cost about \$900. The Webers make little difference in ultimate power output but they do make for a marked improvement in acceleration and prompt, smoothly continuous throttle response.

Dual ignition on the GS and RS engines is credited with increasing their total power output by better than ten percent. One distributor feeds the juice to one plug in each cylinder. Thus, if one distributor should fail, you can stay in the fray on the remaining, separate ignition system.

When laying down the specifications for the original VW engine, Dr. Porsche chose air cooling largely because of its indifference to climate: "air neither freezes nor boils." Air cooling was a must for the projected universal car that could be left in the open in any climate, but that would always be reliably ready to go.

There are other advantages to air cooling, including nicer control in the casting process and elimination of the costly, heavy, superfluous bulk of water jacketing and radiator. The one disadvantage seems to be noise: a water jacket around an engine is a highly effective sound deadener. But the problem of noise has been adequately coped with in latter-day production of the Porsche family of engines, as far as the Porsche-VW market is concerned. If customers should ever begin to complain seriously, it could be coped with even more. Aside from this one objection, everything is in favor of retiring the water jacket along with the whip socket.

Dr. Porsche's *boxer motoren* are a revolution in power plant design, a sort of ultimate simplification. The basic design is a modern, intensely rational solution to the problem of propelling a car by means of a piston engine. It probably will retain its excellence as an answer to this problem as long as piston engines are being made. #

Porsche Speedster

(Continued from page 17)

gave an extremely comfortable ride, although too soft for optimum cornering, it was not until pressures had been raised to 28 front and 32 rear that the full precision of the steering could be enjoyed. It's not the sort that seems to anticipate your commands, it just translates them into instantaneous movement. It contributes to the solid, stolid feel of the whole car. It has a few ounces of resistance to any change in direction which renders the system steady, but effortless to operate. I drove as far as a half-mile at a stretch with my hands away from the fine-feeling, 15½ inch wheel. The car, travelling at 55 mph, held a perfectly straight line.

The 1600's brakes are as good as its steering. The brakes of early Porsches fell considerably short of perfection until 1952, when the big, bimetal-drum, two leading-shoe hydraulics used on the Liege-Rome-Liege rally winners were made standard for all production Porsches. These brakes have as much authority at 100 mph as they do at ten. Stopping distances are laughably short *without* locking the wheels, without leaving skid marks. These powerful stops scarcely pitch the passengers at all and fade failed to show during deliberate, demanding downhill tests.

The Porsche's four-speed all-synchro transmission with overtop fourth is another factor in determining this car's unique personality. On up-shifts the smooth, silent, butter-slicing engagement of gears is uncanny, positively spellbinding. On down-shifts it's the same, providing speed limits are not exceeded. These limits are 62 mph for shifting into third, 37 for second and 12 for first. However, equally smooth down-shifts can be made from higher speeds by use of the simplest crash box double-kick technique. This gearbox design was created originally for the stillborn Cisitalia Formula I car and has since been used on Ferrari and Maserati grand prix machines. Enough said.

On the negative side for a change, the floor-shift lever is long and springy and the shifting linkage has a spongy feel. The lever's travel is excessive and getting it into reverse frequently degenerates into a stubborn struggle between drive and mechanism. Even when reverse (not synchromesh, of course) can be engaged readily, merely overcoming the spring-loaded safety re-

quires far too much muscle power. The clutch takes hold softly and smoothly but its pedal travel also is undesirably long.

Some previous Porsche models have been guilty of excessive engine noise even when new, but this charge cannot be brought against the new 1600. With its 900 rpm idle it emits a pleasant, low-level buzz when standing still. In motion, those riding in the car can hardly hear the engine at all. A very faint, pleasant chirp, probably in the venturis of the twin Solex carbs, is the most pronounced sound, and it is only apparent when manifold vacuum drops. The exhaust note is an impeccable purr. The designers know their bite is good; they can do without an exhibitionistic bark.

Although the 1600 engine's published torque curve is fairly flat and high from 2000 to 4000 rpm, it struggles against its harness for a long moment in getting away from a dead stop. This is in spite of the fact that first gear is abnormally low. Once the engine starts winding in this gear the rev counter is red-lined in less than two seconds, calling for a lot of alertness on the part of the driver who wants to get the most out of every shift. It's much better for the engine not to wind it too tight in first but to get into second as soon as the car is rolling nicely, say at about 3000 rpm. The red "pie slice" on the rev counter starts at 4500.

Third gear in the 1600 is tremendously handy, offering gutty acceleration from about 25 to 70 mph. The less than one-to-one fourth is surprising for its pulling power. It's perfectly adequate for tooling along in traffic all day. The town driver in a hurry can stay in the very flexible third; he'll have no trouble in staying with or leaving the horsepower leviathans.

One of the most salient of the 1600's features is its solid, built to last and last feel. Its body is this way. When you close the light doors they seat with a *chunk* that translates as quality. On one occasion I drove about ten miles before discovering that one door was on the half-latched position — it had not rattled once.

There were no squeaks or rattles at all in the test car's body and everything worked perfectly and smoothly — doors, hood, engine cover and, above all, the convertible top. This is a device that

one person can raise or fold in half a minute and with complete ease. Being simple, perfect, and well finished it is in harmony with the rest of the car.

Its paint is like porcelain. The upholstery is of very good quality. The small, curved windshield is beautifully and substantially mounted and is without visual distortion. The method of mounting the rear view mirror makes it possible for a driver of any height to make the adjustment that is exactly right for him. The bucket seats have ventilated backs and a wide range of fore and aft adjustment. Heat from the air-cooled engine supplies a built-in heating and demisting system in the passenger compartment. For a car of its very modest dimensions luggage space behind the seats is good and of course there is more useful space under the hood. A couple of suitcases or overnight bags can be carried in the Speedster with no strain. The only area in which there's an aching need for more space is that where the occupants' feet must repose. It's narrow, and it enforces a position that can be tiring on a long run.

The spare tire and wheel are stowed under the hood, at the front of the car. Also in that space are the fuel tank (1.5 gallon reserve), a dip stick, a jack built to outlast ten cars, and a tool kit. This contains a set of fine metric end-wrenches, a special spark plug wrench (without which you're likely to be grounded), one of the world's best lug-nut wrenches, a fine dial-type tire pressure gauge and a number of other tools. Also in the kit are spare drive belts, a spark plug and, just in case, an extra lug nut. Such a set in this country would cost about \$25, yet it comes with the Porsche and is *not* an extra.

When our test was complete, Mr. Post's personal 1600 still had less than 500 miles on its speedometer. This optimistic instrument had been pushed to indicate almost 110 mph at an actual clocked speed of 98 mph. If the saying is true that if you want a car to be fast you should break it in fast, this should be a rapid car indeed. One thing for certain is that in another 1000 miles it will be capable of breaking an honest 100 mph and its acceleration times will be even better. #

Love My Mog

(Continued from page 21)

handlers. Simple as it was, the thing sold in quantities beating the combined totals of the competition. Light as it was, it possessed great inherent strength and rigidity. Morgans were all-time's fastest tricars, won more races and broke more records than any rival make. Power for power, Mogs used less gas than pretty well anything else on wheels, just so you held your lust for speed in check. The balance of the machine was such that a practised operator could drive around in circles with his inner front wheel poised a couple of feet off the ground.

Morgan's speed successes date back to before the first world war. At Brooklands, the English Indianapolis, in 1912, H.F.S. himself averaged just a lick less than 60 miles per hour for one hour. A year later, at Amiens, France, W.G. McMinnies won France's own international Grand Prix for cyclecars, and this at a time when the French were up to their armpits in the cyclecar craze. In the 20s, at Montlhery track, near Paris, a woman drove a Morgan more than 101 miles in an hour; this was the Amazonian Gwenda Hawkes, a sister of Glub Pasha, of Arab League fame. Another time she was the female end of a two-driver partnership that kept up 64.8 m.p.h. for twenty-four consecutive hours with a Morgan, again at Montlhery. In and around Malvern's production heyday — they built 1700 trikes in 1927, their peak year — Morgan owners were gathering in silver cups at the rate of hundreds per season in every kind of speed and regularity contest, from straightaway sprints to mudplugging trials.

No wonder, with a record like this, that Mr. Morgan's wonderful trike became a legend in its lifetime. Indeed, if it weren't for the half-truths that it abounds in, and the fact that it's in the wrong tense, the legend might be acceptable at something like face value. A hot Morgan, in its day and at its price, was practically the perfect tool for a young and healthy male. But it wouldn't be today, and honorary gossellers who try to tell you it would either lie in their teeth or delude themselves totally.

It steered like a truck. Braking was problematical. Its springing, independence notwithstanding, was a masochist's delight for harshness. In the absence of any form of flexible engine

mounting, those .bib V-twins telegraphed their every vibration and wallowing power impulse back to the office. In wet weather, on the tram tracks that enskined most British cities in the 20s and 30s, injudicious placement of the back wheel could send the thing into a lightening spin, usually ending in back-to-front progression. The body of an Aero or Super Sports being roughly triangular in plan, width across the seats was narrower than the narrowest four-wheeler of comparable tread; so unless the fellow travelers were unusually slim their Mog fitted them like a cover girl's sweater. The canvas top featured for years on the Aero and Super Sports had no transparent panels whatever at back or sides, resulting in zero visibility astern and very little to right and left; within, with this canopy erected, there was gloom to vie with the "dark unfathomed caves" of Gray's poem. Finally, you had Harry Morgan's manual accelerator to conjure with.

This deservedly unique substitute for a pedal was fitted on one of the steering wheel spokes, so that its whereabouts was never the same for long. With the helm in the straight-ahead position you shifted it upwards to poke the fire, and it therefore follows, down to shut off. But on either extreme of lock the lever moved bodily from the 3 o'clock to the 9 o'clock spot, and simultaneously its motion went into reverse, i.e., you pulled it down for more gas and up for less. So, while H.F.S. could rightfully claim to be a pioneer of two-pedal control, his alternative was not without its snares.

Actual operation of the throttle was through an enclosed multi-strand cable, motor-cycle fashion. There were cases on record of the throttle sticking open on full noise. It happened to me once with a Super Sports I ran in the middle 30s. More memorably, it happened to two friends of mine, Henry Laird and Michael McEvoy, who had supercharged the former's J.A.P.-engined Super Sports and thereby hoisted the output to over 70 b.h.p. Like all the Mog twins of its era, this one was sparked by magneto, but unlike the general run it had no ignition switch. Having spent a lot of time and money on the blower conversion and incidental soup- ing, Laird, who was driving, was unwilling to simply declutch and let her

howl until a con rod came through the side. So by frenzied pantomime he suggested a drastic alternative to McEvoy. Catching on promptly — just as well, because they were hitting ninety — Mac projected his torso over the windshield, wriggled prone along the short hood and snatched off both spark plug leads.

The reason why it was such tough work hauling a Morgan around corners was simply a matter of steering ratio. For many years there was no reduction gearing at all, so the wheel in effect was purely a pair of circular handlebars. Then, sometime in the 20s, H.F.S. standardised a modification that his more effete customers had been smithing on their own initiative for years, adding an epicyclic reduction box at the top of the steering post, Model T Ford style. This still left the steering higher geared than on probably any other automobile in the world. It had to be, otherwise when making a U-turn the driver never could have kept up with the round trips made by his throttle lever, or remembered whether to hither or yon it in emergencies.

Independent accessory firms, incidentally, marketed pedal conversions for Mog accelerators. They worked quite well (I had one), but tended to crowd the other two pedals. Even without the extra foot control, space was meager enough in this department.

Back in the days before front wheel brakes were fitted on the general run of passenger cars, Morgan had both his binders — two were legally compulsory — on the one back wheel. Nobody expected much stopping power from such a system, so nobody was disappointed. But if they looked for a 200 percent improvement when in due course he added drums to the front wheels, then they were indeed disappointed. H.F.S. had a choice of three ways of applying three-wheel brakes, and he tried them all at one time or another. Interconnecting the lot was a failure because they wouldn't stay in balance for much more than two days at a time. Coupling the pedal to the back wheel and the hand lever to the front pair, the layout in fashion when I ran a Super Sports, was no better, probably worse: too easy to lock the back wheel on wet roads or in crises, and too difficult to steer, control the throttle and do the important

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Safety Bulletin —



WHEN IS A SEAT BELT A SAFETY BELT?

INDUSTRY figures show that next to law enforcement agencies, sports car owners are the nation's heaviest buyers of seat belts. It's a cinch, then, that SCI's readers have a built-in appreciation for these life-saving devices and will welcome what actually amounts to the first truly authoritative buyers' guide in this field. Its authority rests on a solid background:

In May of 1953 the California Highway Patrol began equipping each of its new vehicles with seat belts. The Patrol realized at the very beginning of this state-wide program that the belts selected would have to meet certain standards of quality and performance if they were to be really safe. Such standards already had been adopted by the Civil Aeronautics Administration and the Patrol accepted them on the grounds that what was considered safe in the air should be safe on the road.

CAA Technical Standard Order C22B specifies a loop holding capacity of not less than 3000 lbs. around a block representing the human body and a buckle release pull of not more than 45 lbs. when the belt has been loaded to 2850 lbs. and relieved to 250 lbs.

Then, in late 1955, a new section was added to the California Vehicle Code. It defines a legal seat belt as one which meets the CAA requirements. It says that no person shall sell, offer or keep for sale, or install and use a safety belt that does not meet these requirements.

On March 9 the Patrol announced the results of its first tests of seat belts that are available to the motoring public. The results were shocking in that out of more than 70 belts now being marketed only 13 passed the basic CAA test. They are:

Maker	Belt name or number
Samson Auto-Seat Belt Co.	Samson
Brown Line Corp.	WB 2009-3, W 2020, WB 2021
McJohn Corp.	Crown SC-10
Davis Aircraft Products, Inc.	FDC-2500-F-1
Ford Motor Company	FoMoCo
Hicock Mfg. Co. Inc.	SB-11
Aero Safety Eqpt. Co.	Lifeline Standard
Frank Maximoff Research Co.	Mereco 15-1-DA
Chrysler Corp.	MoPar 1685020
Sparton Automotive Division	Sparton Karbelt SKB-1, SKB-2

Seat belt manufacturers whose products did not qualify and who wish to continue doing business in California will have to upgrade their belts. As they do and meet the CAA requirements, their acceptability will be announced. Meanwhile, many experts are urging that the 300-lb. minimum strength is too low and should be increased to 4000 lbs. #

(Continued from page 57)

part of the braking with just two hands. Thirdly and lastly, Morgan reversed this prescription, making the pedal work the front brakes and the lever the rear one. At that, I never drove any standard Mog that would stop before it was good and ready, by which time I was usually good and frightened.

Considering its power and small size, an off-the-shelf Super Sports was not as fast as its noise and neck cricking acceleration would lead you to expect. Maximum was usually nearer 75 than 80. Partly, no doubt, this can be attributed to the atmosphere tumult created by the outdoor engine and its drag-inducing etceteras: pushing a Mog through the climate at anything over seventy was rather like knocking in a nail head-first. True, the stern of the Super Sports, specially in the era before they broke up the contour with a spare wheel, was by no means a bad bit of empirical streamlining; but there wasn't much use in making life easy for tail eddies if the tail itself spent half its life in a virtual vacuum. Of course, H.F.S. had other things to think about besides fancy stuff like aerodynamic penetration. One of the charms of the trike was the superior accessibility of its working parts, and the engine in particular. The clientele wouldn't have thanked him if he had broken the habit of a lifetime and hidden his beautiful J.A.P.s and Matchless away behind a lot of tin lingerie, apart from any question of unwelcome extra weight.

From the strictly practical angle, the disadvantages of the engine's exposure and up-near-the-accident location were few and unimportant. In very cold weather there were occasional instances of the slides freezing solid in the carburetor. Prior to 1934, when waterproofing measures were adopted, the distributor was prone to drowning under very wet conditions. On the other hand, to compensate for the undersized radiator fitted to some of the earlier water-cooled Malvernware, this engine position provided a useful degree of supplementary air cooling, gratis and for free. Even so, prolonged speed bursts were known to provoke boiling in summer heat, and when this happened the blow-off of rusty water would spray back and paint the windshield red.

Sometimes it seemed there was a special corps of poltergeists appointed to needle Morgans and their owners. The man to whom I sold my well beloved Super Sports once experienced just such an apparent haunt. He was motoring serenely along one day when his 8-40 J.A.P. cut out dead. As he slowed towards a standstill, with the

clutch still home and gear engaged, he was aghast to observe that his valves weren't going up and down any more. Neither pair. He stopped, put her into neutral, gingerly inserted the hand crank, and turned, muttering prayers. This time the valves did go up and down, but, quite evidently from the lack of major resistance, the flywheels didn't rotate and, need we add, the pistons didn't reciprocate.

After a couple of Scotches in an adjacent tavern to restore his nerve, he gave it another twirl. The engine fired instantly and with undiminished beat. It continued to do so all the way home, fifty-odd miles.

On these J.A.P.s the hand crank engaged with a dog on one of the camwheels, instead of with the crankshaft. What had happened, as revealed by a panic-stricken teardown, was this: the nut holding the appropriate timing wheel onto the main shaft had slackened and fallen off, allowing the wheel to travel the length of its keyway. With the wheel in the off-key position the act of winding the crank had of course turned the cam but not the crankshaft. Then at the critical moment the resident poltergeist had nudged the straying pinion back onto its shaft just far enough for it to make "linear" engagement with its mating wheel. By some thousand-to-one chance the valve timing, after a completely haywire interregnum, had been accurately restored.

An imposing feature of the Super Sports was its high level exhaust system, with a separate big-bore pipe draped down each slide of the doorless body. You could either run this model or a girl friend of the clothes-proud, sybarite type, but not both. If she didn't burn her leg on the hot plumbing on the way in, she did it getting out. Or, in the course of motoring, she absent mindedly used her near-side pipe as a bannister and scorched the palm of her glove.

The silencers, slight gouty swellings on the noble sweep of the system, contrived to be inefficient in two senses. They didn't subdue that forty-horse commotion noticeably, yet they set up dour back-pressure. This last I know from experience, for until we added some non-standard fastenings to the mufflers on my 1933 S.S. they used to blow clean off at around 65. First one, then the other. Driver and passenger would make little bets on which one went first.

By the same token, a Mog man I knew ran an Aero with an amusing quirk. Almost precisely at 45 an hour, air blast ricocheting off the highway would lift a loose floorboard on the

(Continued on page 60)

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BRITISH AUTOMOBILE RACING CLUB

(Continued from page 59)

passenger side, directing powerful gusts up inside the skirts of the chickadee of the moment. The driver had trouble keeping eyes-front on these occasions, but nothing to compare with the trouble he got when he didn't.

The same fellow, now in his fifties, still bears a scar on his temple as a memento of a contretemps with his Aero. His home garage was at the end of any alleyway, just one Morgan wide, leading at right-angles out of a steepish section of main road. Aeros, of course, had no reverse, so he evolved a homely technique for putting the thing away tail-foremost without personal exertion. Heading uphill, he would deliberately overshoot the entry by a few Mog lengths, then snick into neutral and make a descending turn by gravity, coasting backwards. In the small hours one morning he minutely misjudged the manoeuvre, clipped the apex of the kerb with his front wheel and cap-sized. The Aero, although a feather-weight ensemble, trapped him in such a way that he couldn't move a muscle. It was half an hour before his muffled cries brought a rescuing cop to the spot.

Among the more dreaded ills to which the Aero, and the two-speed Super Sports after it, were heir, was the simultaneous engagement of both gears at once. A locked back wheel at speed, specially on a wet surface, wasn't funny, even if that direct steering did lend itself to lightning correction of the resultant slides. A track racing forefronter of the early 20s, one F.B. Ware, brought his speed career to a premature close when his back tire threw a tread at 80 during the 200-Miles Race at Brooklands, the tread tangled with one or both chains, the wheel jammed solid and instantly the Mog went into tantrums, strewing Ware and his mechanic out with highly injurious results.

Light Car magazine, London, the favorite forum for Morgan owners, once ran a road test report on a Mog and remarked that "unless everything is fixed securely it is liable to fall off or rattle abominably."

To the faithful, a little thing like an abominable rattle or an occasional missing part was nothing to pick a fight with Malvern over. Still isn't, either. Take away what Shakespeare called the "pleasant vices" and there might even be something missing from the character of the brute. But don't let me hear the faithful claiming that a well-found Super Sports is still a match for what they scornfully call "modern tin-ware" because it isn't, and hasn't been for years. #

Triumph-Ford

(Continued from page 23)

were not. Here's why. The Triumph rear-axle gears were designed for the high rpm four-barrel. The V8 was a low speed machine attaining peak at about 3600 rpm. The 4.57 gearing in the Triumph rear-end would quickly let the Ford engine wind out at low speeds. 4.57:1 gearing means that an engine makes a little better than four and a half revolutions to the rear wheels' one complete turn. At the Triumph engine's top rpm of 4400, the car attained a maximum speed of approximately 75 mph. Comparatively, the Ford engine, which had a top rpm of 3600, would give the Triumph a top speed of only 65. At this rate, the Ford engine would burn itself out at moderate cruising speeds of fifty. With such gearing, the Triumph might just as well be a tractor.

There were two possibilities which would solve the problem: Get a higher speed rear end or do something that would increase the speed of the engine to 4400. The installation of a higher speed rear-end would be a conversion on top of a conversion and would add considerably to the cost. The only reasonable alternative lay in modifying the engine. This was to be done by replacing the stock camshaft with a three-quarter race shaft, and by milling the heads .030 of an inch for increased compression. A three quarter cam was preferred to a full race stick so that the engine could be idled smoothly for normal driving. With the combination of these two slight but important modifications, the engine would now peak somewhere near 4400 rpm and develop about 110 horsepower into the bargain. This would raise the cruising speed to about 70 mph with a top speed of about 80 mph. The 110 horsepower would accelerate the Triumph like a startled cobra. The increased ignition requirement took care of itself as will be seen later.

MOUNTING THE ENGINE

The mounting of the engine presented rather a frightening problem. Because the radiator grill is permanently mounted on the two front fenders as one unit, it was a fixed position which cannot be altered. This means that the radiator, which fits exactly within the shell of the grill, also had a fixed position which cannot be altered. The engine, then, had to be placed back sufficiently so that the fan

would not interfere with or touch the cooling fins. Yet, if it were mounted too far back, under the tool compartment of the fire-wall, the angle to the drive-shaft would be too sharp. The position decided upon left a one-inch space between the fan and the radiator, and a half-inch between the fuel pump pushrod and the fire-wall.

At this exact position, it was found that the right front engine support sat directly on top of the steering post (the Triumph has a right-hand drive). The mount for the Triumph tubular chassis was removed and welded to the top of the frame just under the steering column. On this was bolted a one inch piece of flat steel stock shaped in the form of an inverted U. This U piece now straddled the steering column. And on this, the engine was mounted. This design was repeated on the left side to balance the engine properly.

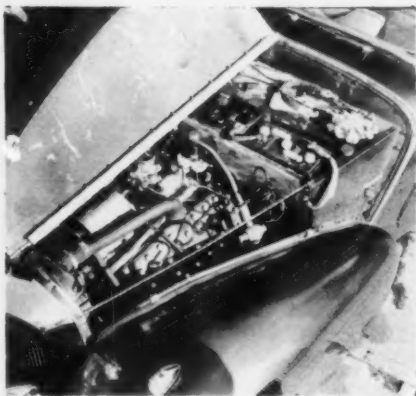
A standard Ford clutch was used with a minor change. The clutch operating shaft which activates the throw-out bearing fork was changed from the left to the right side. Luckily Ford made provision for this change in the bell-housing so that these parts could be used abroad in the English Fords. The clutch pedal was then easily connected to the clutch operating shaft, and no excessive linkage was necessary.

CONVERTING TRANSMISSION MAINSHAFT

The Triumph transmission was now useless. There was no way of adapting it to the engine. In fact, there was little choice. The only transmission that would fit without special adapter plates was a Ford floor shift unit. As it was the transmission had to be adapted to the Triumph drive-shaft, and somehow the speedometer cable had to be adapted to the transmission. It must be remembered that the speedometer is geared in proportion to the rear axle ratio, and the circumference of the tire. Therefore if the Triumph speedometer was to be used, cable gearing had to be maintained.

From the back of the original Triumph transmission, Hodgson removed the speedometer gear housing. Then he designed an adapter approximately six inches long and four inches wide which was machined from a flat piece of aluminum stock one inch thick. This adapter plate had a dual function. One, when bolted to the rear of

the Ford transmission, it would retain the rear transmission bearing. And two, it would hold the speedometer gear housing, which also contained the rear grease seal for the transmission, making it a part of the unit. The mainshaft of the Ford transmission was cut just at the splines, machined and tapped. The Triumph mainshaft was also cut, but at a point where the drive gear for the speedometer cable would be perfectly centered in the speedometer housing. The cut end was machined and threaded so that it could be screwed into the tapped end of the Ford mainshaft. This grafted mainshaft was then machined to make the joint smooth and true. Around this joint, a collar was fitted, welded, and the mainshaft was then heat treated to restore the metal to required temper and hardness. The new mainshaft was then balanced and set into the Ford transmission.



INSTALLING THE RIGHT EXHAUST MANIFOLD

The fitting of the right exhaust manifold added to the complexities of the job, a problem entirely unforeseen. Until recently, V8 engines were designed with a single exhaust pipe leading to the rear of the car. Both banks of cylinders, then, had to be connected by a cross-over pipe. The left manifold was equipped with an extra flange at the rear that led to the exhaust system. Not only was there just no room for the cross-over pipe, but the right exhaust flange with which the pipe would have joined was in direct line with the steering column. The only thing to do was to close up the flange hole with a piece of flat iron stock, and weld a new flange into the manifold a few inches back where it would clear the steering post. An exhaust pipe was then bolted to this new flange, and an exhaust assembly was mounted to the right side of the under carriage. A separate exhaust set-up was installed on the left side, making a complete dual exhaust system.

RE-DESIGNING THE RADIATOR

The depth of the Triumph radiator

made up for its narrow width and its capacity was very nearly that of the Ford radiator. It did, however, have only one inlet and one outlet. The radiator was dismantled, and the two hose connections removed. A piece of sheet metal was placed on each opening, top and bottom, and soldered all around it. Four new openings were then cut into the radiator tanks, and four necks, removed from an old radiator, were soldered into the proper places. So far, the reworked radiator cools the engine remarkably well.

TWELVE VOLT SYSTEM REMAINS

The twelve volt electrical system of the Triumph had every possible good feature to recommend it as part of the new installation. Naturally, the prime considerations were expense and convenience. Everything electrical on the car operated on twelve volts; the parking lights; the headlights; the rear lights; the stop lights; the direction signals; the horn; the ignition; the battery charging indicator on the instrument panel; and the instrument panel lights. All these items would have to be converted if a six volt system were installed. There was nothing to be gained by such a substitution. In efficiency, the six volt arrangement would be far inferior to the twelve volt system; the twelve volt battery is able to withstand more abuse. The headlights produce a distinctively bright beam. Where a six-volt ignition will attenuate and become spasmodic at high engine speeds, a twelve volt ignition will not tend to drop off too much.

A late model generator mounting support and band assembly was obtained and the Triumph generator strapped onto it. The Triumph ignition coil was in the system. The rest was all Ford.

The six volt starting motor remained on the Ford engine. Its use is only momentary, and the twelve volts passing through it for that time doesn't even begin to warm it.

RESULTS

While the top speed may not have been increased much over what it was previously, the acceleration rate was vastly improved. The Triumph's best recorded time from zero to sixty was 23 seconds. Now, although an accurate check has not been made, it has been clocked somewhere between thirteen and fourteen without straining the engine to do it. The Triumph may not be able to walk away from every car when the light changes but at least now it doesn't get stuck for the light twice. Prokine is temporarily happy with it which is, after all, the important consideration. But every once in a while, I get rumors from the service pits that Prokine is thinking about that rear axle. #

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T-Bird

(Continued from page 29)

reading 143, the most optimistic error I've come across in a long time and one that the pink-slip jousts would do well to remember. Another good point to remember is that on a car as heavy as the Bird ordinary passenger-car tires are likely to start shedding their threads after 8 or 10 miles of 110 to 115 mph driving. Ford had the cars at the proving ground equipped with Firestone Super Sport tires — tubeless, of course. Under the Bird's hard acceleration the tires slip on the driving wheels and would easily shear the valve stems from conventional tubes. Anyone contemplating serious dragging, using standard tubes would do well to put screws in the wheel rims.

The Bird's brakes are better than they were before. The car I tested last year and this year's test car both had power brakes. In the case of the '55 you could depress the brake pedal a couple of inches and nothing would happen. One sixteenth of an inch more and the wheels would suddenly lock, with assorted embarrassing consequences.

The '56 model's brakes take hold smoothly and evenly. At below 50-mph speeds they lack authority and at 100 mph they seem to serve a sort of token function. These are not the brakes you look for on a sports car or on what the

Europeans call a *gran turismo* machine. You learn quickly to downshift to Low Range to add to the car's braking power.

On the whole, the Bird feels quite good at high speed — as good as any loose-steering car can feel. But this and the tendency to dance on its springs makes driving the Bird a more nerve-tightening experience than the average sports car driver is happy to accept.

Another objection that the man who wants a pure sports car is likely to make is that the car has far more iron than it needs. The Bird may be small by Detroit standards but it's unnecessarily bulky and ponderous for a high-performance car. Here again the car's dual personality is the reason. The Bird is based on a shortened version of the Ford convertible frame which, with its rugged cruciform construction, is itself a heavy device. On the Bird this frame is beefed up even more with an immense amount of strap iron that is hand-welded to the bottom of the frame. This iron, two inches wide and half an inch thick, is applied to the side members of the frame and to the four segments of the central X-member. The resulting structure ought to be very rigid and reliable. As a sports car frame it is laughably heavy. As a touring car frame it is ruggedly substantial.

On many other touring-car counts the T-Bird scores very well indeed. It has plenty of room for luggage and passengers. It doesn't have the shoulder-cradling bucket seats that the sports car *aficionado* might prefer, but its yielding upholstery does an above-average job of body bracing. Furthermore, the bench seat is wide enough to accommodate three adults in total comfort or two adults and two kids. The detail work is excellent by any standard, but most important to the American mass market, it meets good U. S. standards of quality, style and comfort. I detected only one jarring note in the luxurious overall effect; cranking the windows up or down is so difficult that you would welcome power assist.

Physically, the '56 Bird, like the '55, is a handsome beast. The biggest styling change this year is, of course, the switch to the continental spare, which makes the car look more like a logical successor to the old Lincoln Continental than the new Continental itself. Naturally the new, external mounting for the spare makes a big difference in the T-Bird's luggage capacity — something all short wheelbase cars can use. In a car that is not essentially a competition machine, the style and utility benefits of this change more than compensate for the small sacrifice in additional wind drag. #

Monza

(Continued from page 37)

by Weber is no surprise, and the Monza uses two of the 58/DCOA/3 type twin-choke carburetors. These are really prodigious, and carry 44 mm venturis. Webers are noted for their careful interior streamlining and "straight-through" design, which is fine at high revs but impairs proper correction for low-speed running. Paul Frere quotes a volumetric efficiency of over 100 percent at 5000 rpm for the similarly equipped Ferrari Grand Prix engine, which should be approached by the thorough intake and exhaust tuning on the Monza. Very short angled alloy pipes connect the gas-works to the ports, and stubby velocity stacks are fitted. A heavy throttle linkage cross shaft is carried in two ball bearings.

A notorious torque producer, the

Monza top end imposes a high level of stress on the rest of the engine and drive train. In actual fact the less glamorous bearing end of the engine is a trifle overstressed, and as a result the standard Monza's full-bore racing life is limited on the average to a period of seven hours. Beyond this point tune falls off and clearances become excessive, calling for a complete rebuild and renewal of bearings, pistons, etc. Endurance races have thus seldom been the Monza's meat.

The short head and cylinder unit bolts directly to the very deep Siluminium crankcase, and rubber rings form water seals at the bottoms of the individual cylinders. Very simple solid webbing supports each of the five main bearings, which are 2.36 inches in diameter and available in four under-

sizes. The webbing continues down an inch and a half or so beyond the crank centerline, to give the deep, I-sectioned bearing caps some lateral support. There are two retaining studs per cap.

That it may carry the oil supply to the crank and big ends, the center main is $\frac{5}{8}$ of an inch wider than its $1\frac{1}{8}$ inch breatheren. Quite devoid of elaborate balance weighting, the forged steel crankshaft receives the impact through 1.97 inch diameter big-end journals. Aluminum-bronze Vandervell thin wall bearings are fitted here, as at the mains, and four undersizes are again available.

Connecting rods are short and simple, the sides of the I-section center being perfect tangents to the outer diameter of the wrist-pin end. Two bolts retain the big-end cap, while the

fully-floating wrist pin receives its lubrication from splash alone. The pistons are completely skirted and carry two compression and two oil rings, one of the latter being below the wrist pin.

An alloy cover at the engine front conceals the accessory and camshaft drive train of $\frac{3}{8}$ of an inch width spur gears. The upper gears deal with the cams, while the water and oil pumps are placed low down at the front. Dry sump lubrication is used, and two screened pickups scavenge the front and rear of the intricately finned cast alloy pan. The scavenge oil pump has two idlers, to ensure that it keeps up with the demand, and it supplies a riveted tank on the right hand side.

A single-idler pressure pump draws from the reserve and replenishes the mains through a sump-mounted full-flow filter. Lampredi relied heavily on external and internal piping to carry the oil around, and apparently did not want to mar his crankcases with too many cast or drilled-in oil passages.

Almost excessive simplicity marks the cooling system, which is kept in motion by a twin-outlet pump adjacent to the scavenged oil supply. Drawing from the bottom of the gilled tube radiator, the pump sends the coolest water to both sides of the crankcase, where it can absorb some heat from the main bearings. From there it rises past the cylinders to outlets directly above each combustion chamber. Thus the water is at its warmest when it reaches the exhaust valves, which do not receive any high-velocity cooling stream. The use of sodium-filled valve stems is clearly vindicated. Though it must be lower than the cylinder head, the header tank is integral with the radiator.

An extension from the cam gear-train bevel-drives a cross shaft within a magnesium-alloy box at the engine front. Further bevels rotate the central 12-volt generator and the Marelli distributors at each side. Earlier cars used magnetos, and some of the Grand Prix cars actually used this bottom end with a cover plate in place of the generator. Coil ignition was deemed better for all-around "production car" use.

A Fimac mechanical pump driven from the rear of the exhaust camshaft supplies fuel to the back end of the carburetor system, while the front end is supplied by a rear-mounted Autolex electric pump. Four rubber mountings suspend the riveted alloy fuel tank.

The starter motor protrudes back from the top of the shallow clutch housing, which encloses a ten-inch dry double-plate clutch with flexible centers. A short extension supports the Hooke-type universal at the forward end of the driveshaft. Four heavy

crankcase brackets mount the engine package on rubber inserts.

Monza torque is transmitted to the rear-mounted gearbox by a tubular shaft and another universal, there being a splined joint at the shaft forward end. Placed just ahead of the final drive gears, the transmission is split vertically in line with the mainshaft and carries the countershaft on the right and the selector mechanism on the left. Dog clutches engage constant-mesh gears in the top four of the five speeds, while a sharply angled jointed shaft transmits the driver's desires from the centrally-placed cast shift tower. A compact, conventional gate is used, with a simple reverse latch-out.

A few of the early-type Monzas had four-speed boxes, but the five-speed version was prepared in time for early 1955 use on both the Monza and the Type 625 Grand Prix car. The smaller Mondial had a similar setup a few months earlier.

A large spiral bevel gear at the back of the mainshaft drives a similar gear on a short cross-shaft at a ratio of unity, and the ZF torque-bias differential is directly driven from the short shaft by helical gears. This final drive alloy casing is also split vertically down the middle, allowing rapid disassembly and selection of any one of a myriad of possible ratios. The use of the cross-shaft and the flat layout of the gearbox keep the whole assembly very low, and prevents any interference with the seats. Deep longitudinal fins cool the sump of the alloy transmission case, while a gear-type pump circulates the lubricant.

Needle-type universal joints are carried almost within the final drive case, as a follow-through from the old swing-axle days, and allow angular variations in the machined half-shafts. Simple splined clamp joints facilitate disassembly, and connect to the hub-mounted pot-type universals.

CHASSIS

Early angled tube chassis experiments have been refined into a smoothly contoured structural base for the Monza. Two oval-section tubes constitute the main members, and are cross-linked and integrated into the body by many smaller round steel tubes. It is thus not a true space-type frame, and as such lags slightly behind current thinking, not to mention advanced design as exemplified by last month's D Jaguar structure. The Monza chassis carries the type number 501, as developed from the Type 500 Mondial.

Rear suspension is by the modern classic, deDion. The $2\frac{1}{2}$ inch diameter steel axle tube curves behind the differential and connects the fabricated

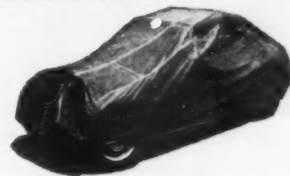
(Continued on page 64)

MARION'S MEANDERINGS

By MARION WEBER



A few years ago, we (my husband and I) were bitten by the sports car bug, the same as thousands of other Americans, and bought a little TD. He drove it to downtown Los Angeles every day and parked it in a public lot. Being a meticulous individual, he wanted to protect the little gem from the effects of the sun, dust and smog, so he tried a succession of car covers . . . plastic, parachute silk, etc., but none of them worked to his satisfaction. After listening to his complaints for several months, I made one to his specifications out of lightweight canvas with aircraft shock cord sewn in the perimeter to hold the cover snugly around the car. Not only did this make Charles and the MG happy, but others saw it and wanted duplicates. My daughter, Bevvie, named the cover the MG Mitten and I went into business on a modest scale producing "Mittens." The Jaguar Jacket, Porsche Parka, Triumph Tunic, VW Vest, Healey Hugger, Corvette Cap and Thunderbird Teepee followed in short order and we have had a wonderfully successful business. In the time since I made the first Mitten, I have expanded my operations manifold because I truly like sports cars and the people who own them. I am gadget happy, too, and when I see a good, well-made accessory for either car or driver and it appeals to me, I am sure that my friends would like it too . . . and I do my best to make it available to them.



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(Continued from page 37)

hubs. At the tube center a ball carries a square bronze block vertically between steel plates in the back of the rear end casing, and thus locates the tube laterally. This point also determines the rear roll center. Lampredi can be credited with the use of two parallel trailing arms on each side to guide the tube and absorb braking torque. Since each set of arms forms a parallelogram, vertical movement of one end of the tube will produce no twisting moment between hubs, and floating mountings are avoided. Rubber bushings are used at the chassis connections, while the axle ends of the arms have ball joints.

A transverse leaf spring is frame-mounted above the axle casing, and is connected to the hubs by long drop shackles. Houdaille vane-type shocks damp the vertical oscillations, which are limited by rubber buffers acting against the deDion tube. Most of the Monza leaf springs now in use are quite flat while in a static position, and a more highly arched pattern is now coming into use. It should give a much more progressive suspension action.

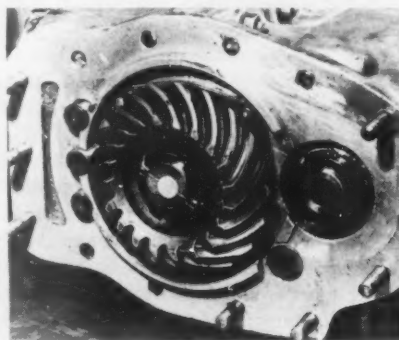
Experimental Monza front suspensions also used transverse leaf springs, as was then current on the G.P. cars. Barcelona in 1954 proved the superiority of a coil layout on the Squalo Ferrari, and a complete switch was made on all Modena models. Basic geometry remained the same, with two low and close-placed parallel wishbones to each wheel, the bottom area being roughly half again as long as the top. The arm components are forged, polished and bolted together. A single wide bronze bushing pivots the top arm to the boxed front crossmember, while two bushings are used for the wider bottom arm. The latter carries brackets for the shock linkage and the end of the torsion anti-roll bar, as well as for the bottom end of the small, slightly "sea-legged" coil spring.

The front suspension geometry is such as to give a roll center very near ground level, but it is raised somewhat by the anti-roll bar. As a result more of the overturning couple is resisted by the front wheels, producing a degree of understeer and leaving the rear wheels free to put power on the road. This, plus the semi-solid differential action, frame-mounted drive gears and low rear unsprung weight give the Monza excellent traction on tricky real-road courses. No strictly airport car, this.

Tapered steering arms extend forward from the forged stub axles, and are connected by a three-piece track rod. The length of the outer members

is so calculated as to be geometrically consistent with the suspension movement. A forward pitman arm transfers movement from the worm and wheel steering box, and is balanced by a slave arm on the left hand side. The long-revered Ackermann steering principle is de-emphasized here, as in many other modern high-performance cars. Three universal joints carry the steering column sharply around the protruding carburetors.

Brakes are mounted at the wheels all round, to simplify installation and cooling. Their mechanical layout looks at first glance like two-leading-shoe, but actually employs a central guide for each shoe to balance out the servo effect and wear, and thus avoid the excessive self-wrapping effect of the usual 2LS brake gear. Two double-acting cylinders per wheel apply force equally to all four shoe ends, and receive it from a single-bore master cyl-



Spiral cut bevel gear of transmission drives helical final drive gear.

inder with separate circuits and reservoirs for front and rear systems.

Ferraris have long been noted for the deep, tapered finning bonded to the steel liners of their brake drums, and have been equally conspicuous for the absence of spectacular scoops on the backing plates. These are just beginning to appear on some Monzas, but most cars have four simple screened apertures per wheel. Air circulation is induced by so ducting the face of the brake drum that it acts as a centrifugal fan and rapidly exhausts warm air from the interior of the unit.

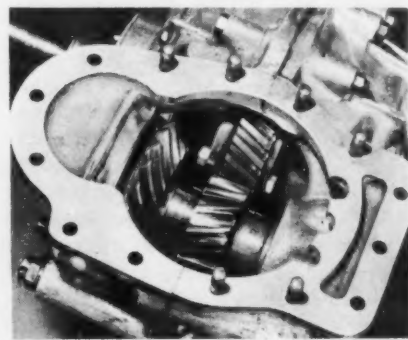
While these assemblies are known to be very potent, it's worth noting that in 1955 Jean Lucas brought a Messier disc-braked Monza to the Supercortemaggiore race and had no difficulty in outbraking the standard cars, particularly toward the end of the event.

The Borrani wire wheels are set well out from the brakes, leaving the finning of the latter exposed to best advantage. Wheel rims are light alloy and the hubs the familiar Rudge type, with two-eared locking nuts.

Racing experience is revealed in the disposition of the electrical equipment where it is readily accessible in the

event of a petty breakdown. The battery rests above the gearbox and between the seats, while all junction boxes, relays, etc. are on a single panel under the cowl on the passenger side. Instrumentation is compact and complete, with tachometer, ammeter, oil pressure and oil and water temperatures. The hand brake lever is suspended on the right hand side of the cockpit, and applies the rear brakes through a cable system.

Various early Monzas had bodies by Autodromo, Vignale and Farina, but the currently standard shape was laid out by Dino Ferrari, son of the celebrated Enzo, and is being executed by the small Scaglietti firm of Modena. Of course there are many options here as in the rest of the car, some of the choices concerning the windshield, headrest, tonneau cover, headlights or brake venting. Most of the cars, however, have large side vents to exhaust



warm air from the engine compartment. Belly pans are often fitted from the firewall back.

Since the Ferrari policy is one of continuous, even headlong, improvement, it is virtually impossible to settle on one cut-and-dried specification for the Monza, but the foregoing provides a broad picture of the design scheme. Factory alterations tend to be subtle, such as the shifting of the engines three inches forward after the 1955 Tourist Trophy. The suspension and chassis also underwent detail changes for last year's Targa Florio.

More than fifty Monzas have been turned out, and it thus attains International Production Sports Car status. As a factory racing car it has been displaced by the new 3.5 litre four, which bears a close family relationship but differs in many details. Monza Ferraris are still available from the works, but only on special order. They have never been the most powerful or the fastest sports cars in the world, but they have been rugged and nimble, and like the series 35 Bugattis, they have won many contests by sheer weight of numbers and will undoubtedly continue to do so in the future. #

Austin-Healey Test

(Continued from page 47)

transmission must be academic, since it is quite possible to drive all day without ever moving the lever out of fourth. I tried a few top-gear starts just to back this up, and the big ex-A90 engine carried it away without a tremor. The clutch helped out by being smooth and light, and later proved slip-proof during a lot of rough use. Unfortunately the distance from pedal to firewall forces a choice between riding the clutch or not using it.

Big displacement, long stroke and low stress combine to give the Healey incredible top gear pulling power, and a right foot down at any speed will produce some response. In this respect particularly, a recent convert to sports cars will find the Healey very easy to drive. He can neglect or forget to shift, lugging it heavily all day, and the Austin engine will remain unperturbed.

Starting is easy, being instant on cold days with the underdash choke, and the idle when warm is smooth and regular at 800 rpm. Linkage from the organ-type accelerator to the twin S.U.'s is complex but sturdy, and response of the slow-turning four is on the sluggish side, which can be embarrassing on hurried downshifts.

Up to its horsepower peak the engine is mechanically quiet and vibration-free, but as 4500 rpm and the red line are approached a substantial unbalance makes itself felt. That red line is very valid and need not be passed for most purposes, though as a matter of interest valve bounce is staved off until 5100 rpm.

While it is shown by the stop watch and results to be very effective, the performance of the Healey lacks the sharp, instantaneous feel of a more highly tuned (and possibly less reliable) machine. The emphasis is definitely on flexibility. When the clutch is engaged hard at high revs for a standing start, the rear end squats right down while the axle tends to hop and skitter, giving the very short driveshaft a workout in the process. This same slight excess of flexibility at the back is noticed when cornering hard on very bumpy surfaces. This is hard to avoid with a softly sprung live axle, and is minimized on the Healey by the use of a Panhard rod for lateral location. In almost every other respect the A-H handling qualities are well above par for cars of its class.

The steering itself is very good for a worm-and-nut box, having only about half an inch of free play at center. It

is quite fast enough for any maneuvers, and is power-steering-light even while parking. Caster action is mild, and there is very little road reaction on any surface. As would be expected, the Burman box just misses the last fineness and precise feel that would be provided by a rack-and-pinion system.

Translated into terms of handling qualities, and combined with a very slight amount of understeer, this means that the initial response to the wheel is a shade slow. Once the angle of approach has been selected, though, the Healey will literally do whatever you want it to in a corner. Great liberties and ham-fisted handling simply could not get it into trouble, and it preferred to execute its repertoire of controllable drifts and power slides.

The understeer is just sufficient to make the Healey a forgiving car without incurring unresponsiveness or heaviness on slow corners. It maintained a "line" smoothly and quietly with a minimum of wheel fighting and without excessive roll, and inspired sufficient confidence to allow the fastest speeds with comfort yet recorded on my handling course.

Not a little of this agility is due to the very handy size of the Healey. The view from the cockpit emphasizes the narrowness and simplicity of the front end, and the beaded fender tops give good sight lines. Vision all around is very good, especially through the wide rear window with the top up. While it commands a very wide field of vision, I do not feel that the convex diminishing-type rear view mirror has any place on a fast sports car. One might be useful on the fender or windshield post, but the main mirror should give you a precise indication of the distance you hold from following vehicles. This one would be plain worthless in racing, and this is not a bad criterion for judging everyday effectiveness.

The seats themselves are pleasantly firm and comfortable. Structural stiffness of the seat back is impaired by pivoting it to the base, but the back contour gives very good lateral support to the shoulders. Long-armed drivers may find that the non-adjustable wheel is a little close, and they might improve both this and the small-of-the-back support by increasing the rake of the back slightly.

A well-shaped rim and sprung spokes make the 16-inch steering wheel pleasant to use, and its stationary center carries the direction signal control and

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(Continued from page 65)

the button for the assertive horn. The choke, heater, air vent, hood release and instrument light controls are all beneath the cowl in various places, only the starter, headlight, windshield wiper and overdrive switches remaining on the elliptical dash panel. These last are the most used, so this makes sense, but most of them are difficult to reach beneath the steering wheel. The wipers, by the way, are self-parking and fast and quiet in operation, and all the minor controls have a smooth, solid feel.

At a glance the instruments are impressive, and they are indeed handsome, but they are placed just too low for rapid reading. The lack of any graduations between ten-mile increments makes precise speed reckoning a matter of interpolation, but the rally-wise will welcome an adjustable trip mileage recorder. One small dial combines oil pressure and water temperature, while the other discloses fuel level accurately when the car is at rest. Indicator lights are provided for ignition, bright lights, and directional signals. There is no specific interior light, but maps can be read by the underdash illumination from the potent instrument lights.

Again under the cowl there is a wide, lipped parcel shelf which will hold a lot of odds and ends even during fast driving. The door pockets are long and deep, but there is no lockable interior compartment for small valuables. A key guards the trunk, however, where there is a surprising amount of room for a small sports car. The spare rests high and forward, and protrudes into the behind-seat cockpit room. Inconveniently, it must be removed before the lid can be raised to inspect the two rear-mounted batteries. Comprehensive tools and jacking equipment repose in depressions at each side.

No matter how highly you might value the protection afforded, I doubt that you'll enjoy opening the trunk to fill up with gas. Also, with a full tank and steady left cornering it's not hard to detect fuel vapors at the rear. A fuel shut-off valve is placed in the trunk, near the S.U. electric fuel pump.

The Healey hood is not large, and the big engine uses up a lot of room, so there are some limits to accessibility, particularly beneath the carburetors. Generator, plugs, distributor and oil filter are all easily reached, though, while the forward-mounted steering box is practically forgotten.

They say that you appreciate something more if it doesn't come easily, and this may explain the snug feeling of the Healey with the top up. Actually, raising and stowage are not too

complex, though a helping hand is welcome, and the problem is rather one of entry and exit. The seat sides curve up, and the side curtains curve in, and the door doesn't open widely, so a narrow path is left for a human being. A little practice and the now-sturdy dash handle help, but it's still awkward.

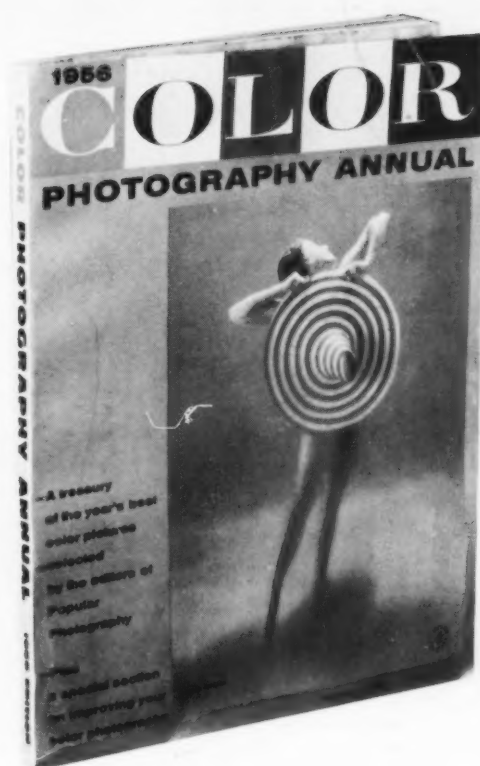
Weather protection is generally very good, though the upper front corners of the curtains still tend to leak wind and rain. Our car had an annoying leakage of cold air high up under the cowl on the passenger's side. The heater was more than potent enough, but the defrosters cannot be operated independently of the main heat supply, and if you want heat on the windshield you must also have it in your lap.

Early complaints about hot cockpits in summer should be avoided now by the controllable fresh air vents and extensive insulation around the gearbox and on the exhaust side of the firewall. The handsomely designed interior contributes to the very comfortable and secure feel of the A-H cockpit, and this impression is not belied by the way the car rides. It is notable among sports cars for a freedom from rocking and pitching, and it always moves flatly and stably. Low speeds reveal a sensitivity to small bumps and ripples, but this diminishes as the Healey gets into its stride. On straight roads it tracks beautifully with a minimum of driver effort, even at high speeds in strong crosswinds.

As is now usual, the headlights can't begin to cope with the car's easy cruising speed of around 80. Nor, also, are the bumpers equal to big city conditions. These are minor criticisms of a genuine 100 mph sports car which, with such normal accessories as heater, defroster, directionals, tonneau cover, wire wheels and overdrive, retails fully equipped at port-of-entry at a base price of \$2985. The only optional item is a radio, and a Motorola unit can be fitted for \$65.

The overall impression left by the Austin-Healey is one of smoothness and competence. Refinement of an originally good design over three years has left very few rough spots, and those that do turn up are largely a function of the very reasonable price. A minimum of effort and skill is required to drive the Healey, and as a result it is near-perfect for the newcomer to the sports car game. This does not, however, preclude its enjoyment by the expert, who will be able to make full use of its complete controllability and versatile transmission system. This breadth of appeal has long contributed to the Austin-Healey's worldwide popularity, which should be enhanced by this latest version. #

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